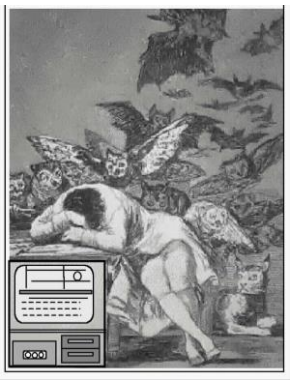
ESSAYS

Essays à la Montaigne

Yuri Tarnopolsky



2001-2015

This file contains all 60 *Essays à la Montaigne*:
Essays 1 to 56, 712 pages, Essays 57 to 59, 242 pages,
and Essay 60 (112 pages) have independent page numbers.
Total number of pages: 1066. Total size ~ 27 MB

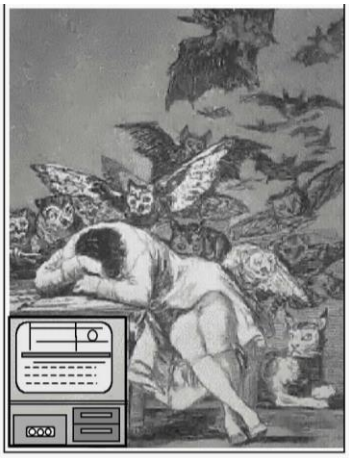
2018

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ESSAYS

Essays à la Montaigne



2001-2015

Essays 1 to 56.
Essays 57 to 60, see LAST ESSAYS
Essay 60 , Art and Nexistence (2015)

Yuri Tarnopolsky

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LAST REVISION: 2016
Many links are dead. The gravestones may still stand.

Discussion of some topics of the **Essays**, especially, **51** to **59**, continues in INTRODUCTION TO PATTERN CHEMISTRY and on other pages in **COMPLEXITY** .

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Essay 1. Essays? After Montaigne?

My Essays are inspired by the famous *Essays* of Michel Montaigne (1533-1592), one of the three favorite books of my youth. *Hiawatha* by Henry Longfellow and *Dhammapada*, a book of Buddhist ethics, were the other two.

Montaigne's book of essays remains a monument to human intelligence with its two polar points: common sense and independence of mind. This alone could be a starting point for a discussion: how can one be independent and at the same time adhere to common sense if common sense is the way of faceless crowds? Let us leave this apparent controversy until some later essay. Here I would like to explain why I believe my essays could be of interest for anybody except myself. Otherwise, I would not attempt this venture because I know myself all too well and have nothing to gain from spilling my knowledge out in an electronic form.

I submit here two reasons.

The first reason is my quadruple identity.

I was born in 1936 in the former Soviet Union, the year preceding the beginning of the Stalin's terror. I was brought up and educated in the Communist society. I wept when Stalin died in 1953, but thirty years later I was arrested and put into a labor camp for anti-Soviet behavior. I left USSR for USA in 1987, the year of the beginning collapse of Communism. In short, I have lived in both worlds. Like an amphibian, I lost my Soviet gills and learned to breathe with lungs. I remember Communism as it was, frozen in my memory, while the memories of my generation living in Russia are overlaid by subsequent events. By Russia I mean here the former Soviet Union, the heir of the Russian Empire of the czars.

In a sense, I am a living fossil. To talk to me about Russian Communism is like talking to an alien from a distant galaxy whose planet does not exist anymore. Who needs Communist Russia in 2000?

Yet as we enjoy reading Montaigne who lived half millennium ago, we may need to read about Communism in another half millennium. Some human creations are as lasting as human nature itself: they are part of the social genome.

My interests have never been limited either by my immediate environment or the official curriculum of my education. Since my early childhood, as soon as I had learned to read, I was eagerly interested in America and life abroad, as well as knowledge in general. One of my first books ever, at the age of eight or nine, was a Russian Geographical Yearbook (something like National Geographic) with several illustrated reports about America of the mid-30's. With time my interests expanded over many subjects well beyond my chemical profession, covering art, natural sciences, philosophy, history, and sociology. I proudly call myself an amphibian in a metaphorical rather than biological sense.

Equipped with both scientific gills and humanitarian lungs (which a true amphibian can never have at the same time but only at different stages), I felt comfortable in both sciences and humanities, the price being the lack of any profound and extensive knowledge of both, as well as the lack of any significant personal, social, or professional achievements. I am in no sense a match to Montaigne who was a two term mayor of Bordeaux. I have never had many friends and acquaintances and by my nature I am rather asocial. The company of four is the maximal radius of social comfort for me. Yet that was exactly Montaigne's idea: to portray not a public figure but a private person observing the world and himself.

Having come to America, I saw the New World with the eyes of a Martian, adapted to a different spectrum. Unlike most immigrants, however, I was much better prepared by my previous interests and knowledge and I knew what to look for. I was interested in all aspects of my new habitat in the same amphibian way, including its possible future. Although thirteen years of my American life is a pretty short time as compared with fifty years of my Soviet life, I instinctively feel that this might be the right time to spawn, albeit simply because there are not many springs left.

In addition to space, there is yet another dimension to these essays: time. In my Russian childhood, even automobile and telephone were exotic contraptions. I still remember my ride in a taxicab somewhere around 1940 as an exciting adventure. When my mother and I returned to my native city in 1944, after it had been freed from the Nazis, a horse cart carried our baggage from the railway station.

I am certainly not unique in this aspect among my generation, but throughout my life I have been closely watching the development of the new science and technology—modern physics, chemistry, biology, TV, nuclear energy, and computers—not just from the media but from in-depth accounts, until their depth extended well beyond my reach. Most of all I was interested in general laws of nature that govern the course of everything.

The media provided me with a wide picture of the world events such as the end of colonialism, the fall of Communism, creation of global economy, rise of Islamic nationalism, evolution of Israel, India, and China, and the advent of other forces of global magnitude or long term consequences, such as the pressures of energy, environment, and a visible balkanization of USA.

In short, I believe that because of my multiple identities—plus a definite arrogance—I might occasionally run into a non-commonsense opinion. It was different in the times of Montaigne and up to most of the twentieth century, but in our electronic age and with Encarta at the tips of your fingers, erudition, factual knowledge, and learning in general

has lost most of its value. A snapshot from a fresh angle, however, may still be of merit: photography combines art and science.

The second reason is simply my admiration for Michel Eyquem de Montaigne and a conscious desire to follow the pattern of essays that he invented, developed, and elaborated. I see this pattern as just following the impulse and whim of my own mind and will. The difference, however, will be obvious.

The form of my *Essays* is purely electronic: I am planning to put them out on my Web site one by one for as long as I can.

English is not my native language and the readers (if there are any) are encouraged to offer editorial suggestions and criticism.

The texts may not be final. I will be returning to some of them, and this, too is a part of my experimentation with electronic publishing and its enormous, possibly, even self-destructive freedom. Hypertext is a powerful and irresistible novelty, which I will try to use sparsely.

My essays, as well as their prototype, are born from a deep melancholy—a beautifully sounding word (*mela* of black, resonates with *mela* of honey) which in modern language has a sinister and totally undeserved meaning of depression, aggravated by its social connotation.

Montaigne, having finished his career in 1570, was anxious to start his golden years of leisure and learning, but he missed his friend Etienne de la Boëtie who died in 1563, and felt very lonely. His *Essays* turned out a self-cure.

Some essays, but not the complete Montaigne, are available on the Web. There is an excellent translation into modern English:

Michel de Montaigne, *The Essays of Michel de Montaigne*, Translated and edited with an introduction and notes by M. A. Screech, Allen Lane, The Penguin Press, London, NY, Toronto: 1991.

There is a complete original French text online.

2001

NOTE (2016): After many years, a large number of the original links in my Essays are dead, which in an oblique way confirms that ideas are a form of life and, therefore, mortal. As patterns, they are as long-lasting as arthropods or mammals.

Essay 2. On the chronophages or time-eaters

[competition for time, competition for limited resource, reverence for life, Albert Schweitzer. Kenneth J. Gergen]

This essay on chronophages, or time-eaters, is a distant echo of Montaigne's Essay 30, *On the Cannibals*, with which it has nothing to do on the surface.

A droplet of water from a pond and even from a tiny pool left by the yesterday's rain is full of life. It is both a botanical garden and a zoo, with the protozoa representing the animal kingdom and the algae standing for the vegetation. One needs a microscope to visit the zoo.

There is some distance from the puddle to ABC or CBS TV networks, but we will get there pretty soon.

The micro-zoo could be an excellent starting point to understanding life in all its manifestations, from hot water bacteria to whales and from earth worms to sequoia. Actually, it is a good starting point for many other things.

All the species in the pool compete for matter to build their bodies and for energy to keep them alive. This alone still does not reveal the essence of life. The rocks in the Japanese rock garden live in eternal harmony because they do not multiply. Interestingly, the gardens themselves can be multiplied: they have a design, a code of a kind, but they need humans to work as enzymes.

We have to add the word **multiply** to any description of any kind of life. This clarification dramatically changes the idyllic picture and makes it messy.

If all the creatures start multiplying, the resources of available matter will be sooner or later exhausted. The creatures themselves will be the only remaining food, tempting, well balanced and concentrated. And so they eat each other in a certain pecking order. Those at the top attack the live food, while the underdogs have to wait until the kings, emperors, and czars die to get their bite at the funerals.

Fortunately for life, there is the blessing of death: everything dies in due time, and therefore everybody has a chance of surviving until its own due time. The matter can be recycled. Death provides nourishment for life, and we, liberal humans of good intentions and meek hearts, are not exception.

This is not so with energy: it cannot be completely recycled. That was a stunning discovery of the nineteenth century, of the same magnitude as Darwinism and genes.

Energy exists in two forms, work and heat, and only work can keep living bodies alive, while excessive heat can only destroy them. The source of work for the life on earth is light, an organized, ordered form of energy, unlike the chaotic heat.

It would be wonderful if we, humans could live on solar energy and be like plants, the only politically correct, green to the bones creations on earth, endowed, in addition, with everlasting beauty.

Until that time of bliss comes, only we, humans, can produce work from heat in our heat engines, but part of it is always lost with heat. No other life form but humans can do the trick of utilizing heat.

The heat engine is a human-made contraption that takes in, for example, steam or products of gasoline combustion at high temperature, transforms part of heat into work and ejects the mixture at a lower temperature, if an appropriate cool place could be found. Part of energy is lost as heat to warm up the cool place. Not a single living organism has this kind of contraption capable of making work from heat. Its invention launched the Industrial Revolution and a new super-biology of Things that are not by human touch.

We can collect the energy exhaled in the form of residual heat and squeeze some meager work out of it, but even a larger part of the new total would again escape as heat. The catch of the heat engine is that each next squeeze has to be done at a lower temperature, and finally we cannot find anything cold enough on earth to wring the last droplets of work out of our flabby tepid heat transfer substance, whatever it is.

If we keep the mini-zoo in the dark, it will not die. The protozoa and algae will look dead, but they will produce their spores, the seeds of new life that do not need energy and matter for their existence because they are almost as dead as rocks and sand, but not quite: they are both dead and alive, more exactly, **potentially alive**. They are like a blue-print of a bicycle: it can be stored for years and even centuries, but somebody will be able to reconstruct the ancient bicycle from the blueprint. The modern bicycle is also a product of long evolution, still bearing the family resemblance to its wooden patriarch born in 1690 in France, which can also be reconstructed today from its blueprint.

The potential future life and destiny (as well as the past of their species) of the spores is written into their genetic code, which is just a long sentence in a language that all forms of life speak to themselves. What is not written is their last life: the sound of the last rain, the shadows of the slow clouds and swift birds, the loose leaf fallen from the nearby tree, and the dog's paw hitting the puddle like an asteroid from the space. What is written is the result of the millions of life cycles during which the forms of life gradually changed from their ancient predecessors to their present appearance.

How was that possible? The answer was offered by another great discovery of the nineteenth century made by Charles Darwin and extended by molecular biology that developed a century later.

And now let us turn on the morning news on any network. We are invited into the world of beautiful smiles, elegant dresses, soft diffuse light, friendly jokes, and happy talk. Everything is designed to infuse our morning coffee with confidence and optimism. Nobody seems to be in a hurry.

Nobody's face is distorted with hatred and cruelty. There is somebody else's blood and suffering on the screen. There are other channels to see a shark devouring a seal and the lion clawing an antelope. There are even more channels to watch humans dismembering each other. This is our American life.

We are strong, free, and independent. There is enough electricity to run the show and the marquees above the streets.

Yet under this glimmering surface we—being in a certain rather morbid frame of mind—can find really brutal struggle for existence. The war goes on between the episodes of the show. They try to slash and slice each other, piece by piece, to cut each other's nose and ear off, to chop off a hand and a foot, and often even to hack somebody else's head off.

The episodes fight for a limited resource, which in this case is neither energy nor matter: it is time, the substance of poets, philosophers, and working moms. The struggle displays right before our eyes: we see interviewed people cut off in the middle of a sentence, their point insufficiently clarified, important issues muddled and unimportant extended, superficial standard questions and reminders "you have twenty seconds," but we also see some really breathtaking coverage pushing its rivals off the nest without any excuses. The commercial time, however, is with rarest exceptions, untouchable.

The issues and episodes struggle for the limited time. The outcome of the struggle is not predetermined because the show is mostly live. That's it: live. The TV news as they exist today is a product of not so long a history and it has evolved right before our eyes from its black-and-white mix of information and advertisement to the present colorful mix of entertainment and advertisement sprinkled by information. Right before our eyes, the morning news has become mostly fun and weather instead of being a source of information. The source of energy is advertisement, the time share of which is ever growing even beyond the strictly commercial time, finding new forms of spreading through the cracks. The source of matter is still the traditional sensational stuff, but we can already see a shift to virtual reality of a magician on the stage. The food for the eyes pushes the food for thought off the bench.

God forbid, in no sense am I criticizing the TV network industry, and for a simple reason: we cannot criticize life. All life is sacred, and so is the life based on competition for time. All evolution is sacred, no lion is better than a hyena, and ameba is no worse than whale. From the evolutionary point of view, no Charlie Rose show is better (or

worse) than Jerry Springer's because all this is life of TV, and TV is a form of life itself. The sanctity of life means that all its forms are equal from a certain point of view. And by life here I mean meta-life: all forms of competition for a limited resource involving a code of a kind transferred from generation to generation and subject to mutations.

Here it seems appropriate to recall Albert Schweitzer and his philosophy of reverence for life. While for Schweitzer life meant a phenomenon of strictly biological nature, we still could apply the principle of reverence to all forms of life based on competition for a limited resource, all the more, they are still run exclusively by humans: life of weaponry, TV, corporations, toilet paper, aviation, music, poetry, transportation, religious fundamentalism, and birth control.

Unlimited spread of life leads to competition for matter and energy. The principle of reverence for life, therefore, if applied unconditionally, is in fact irreverent to life. As result of competition, some forms of life will suffer and others face elimination.

The shocking side of such reverence for meta-life, i.e., life as evolution of forms, seems to be that we have to embrace war, struggle, conflict, aggression, expansion, corruption, politics, and even robbery and murder as much as the stinky ugly hyena mangling the beautiful defenseless baby antelope.

Actually, this is what we, the humanity, have been doing since our cave times. The apparent dilemma follows only from mixing up ethics and science. Both, however, are forms of meta-life, too. The stele of Hammurabi, created in the eighteenth century BC, is one of the earliest forms of the genetic code of law and ethics. On the one hand, it protected the weak and poor from injustice, but, on the other hand, punished the guilty by death for minor (from modern point of view) offenses. Reading the laws of Hammurabi, I always hoped that their cruelty could have been mitigated by bribe.

All we can do, before making an ethical or logical judgment, is to look at the issue from the point of view of the laws of nature. Is it a form of life or not? If it is, is it alive or dead? What is its source of energy? What is its source of matter? What is its code? How fast is it changing? Such an open-minded approach could reveal some things usually hidden from the focus of attention of network TV news and even the public TV, which is also a form of life with its sources of energy and matter, and its own claws, fangs, and means of mimicry.

After that, we can decide whether something is good or bad for us. The rock is dead (is it?) and we have the right to crush it into gravel. The tree is alive and let us think hard if we really need to cut it. The man with the rifle is alive. Do we really need to kill him? The fetus is alive (is it?). What is that we can and cannot do with it as compared as what we can and cannot do with our own ailing hand or foot? As soon as we expand the notion of life, among the host of new intriguing questions the unavoidable pro-life/pro-choice controversy arises.

I would put understanding before the emotions, although from my own experience I know how difficult it could be. The Russian poet Alexander Pushkin once noted that the habit is a heavenly gift: it is a substitute for happiness. I see emotions as a gift from hell: they are a substitute for reason. I suspect that both ideas first occurred to the ancient Greeks who had wars instead of TV serials, with a lot of time on hand for exercising their minds between the wars.

Competition for time has been created by the human production of Things: objects designed for consumption by humans. They all compete for the shrinking pool of human time that is being eaten off by commute, increasing workload, checking junk mail and email, reading junk documents designed by computers, and waiting at the airports.

Competition for time is shaping our life, with so much of that life taken by TV, commute, and work. All this is obvious. But could any new forms of meta-life originate from this overpopulated pool of time?

Emotion, or heart versus reason, is a great gift, too, whether from hell or from heaven. We cannot live either by reason alone or by heart. In our mind, as well as in our heart, the same competition for a limited resource goes on between contradicting impulses and decisions, as well as between reason and emotion. The pool of outcomes, however, is of the size of a single action. This competition looks more like a Miss Universe Beauty Pageant: there is only one crown. We can think in thousands of ways but act only once.

It is worth remembering that the chronophages feed not just on each other's time, but on our own time, too, although most of us will never be seen on TV network shows. Junk calls and junk email, tiny electronic bacteria, are most potentially fatal types of chronophages because they multiply with the speed of light possible only in an electronic medium and never in water.

We are luscious green pastures for the time-eaters, and there are many species of them. Remarkably, we, the omnivores, cannot take a tiny bite of them! In the world of time we are the grass and all we can do is to savor this new refreshing and humbling feeling of being a low form of life and looking up to the Things that feed on us (see **Essay 6**).

NOTES:

1. More on chronophage on the Web (but not quite what I mean).

2. On intellectual competition, see Randall Collins, *The Sociology of Philosophies: A Global Theory of Intellectual Change*, Cambridge, Massachusetts, and London: The Belknap Press, 1998.
This book is remarkable for many reasons. One of them is that it shows the world of philosophers and intellectuals in general as competition for limited resources, very similar to what happens in a droplet of water. Collins calls the resource "attention space." In the struggle for the place in that space, philosophers form a real ecosystem

with symbiotic and antagonistic relations and take positions in something like a food chain.

3. A brilliant picture of the competition for time and its implications can be found in: Kenneth J. Gergen, *The Saturated Self: Dilemmas of Identity in Contemporary Life*, NY: Basic Books, 1991

2001

POSTSCRIPT. By 2016 the extent of digital time waste, especially, by social media and among younger generations, is truly gargantuan. It is slowly becoming the subject of public debate, adding to the waste of time. You can now waste time with "smartwatch," a wearable wireless crabapple on a digital apple tree.

Essay 3. On free hay trade

[freedom, negotiation, Hammurabi, understanding]

There is no such thing as freedom without an *of*. Like transitive verbs, freedom is "transitive": it requires "of what." There are freedoms of choice, religion, speech, abortion, movement, etc. "Freedom. Period." is as abstract as weight and length. What can we do with abstract weight? Or abstract taste? This is why somebody who says "I am free" conveys his feeling, not fact.

It seems to me that the closest approximation to universal freedom is freedom of negotiation. Two persons offer their goods and start negotiating the exchange rate acceptable for both. It is simple to do when one or both goods are just money because money has a single attribute of value, while goat, horse, or baseball player have many qualities, hardly summarized by anything but money.

We pay a price for everything: for staying married, for divorce, for being a parent, for education, for the joys of food and sex, for being a good neighbor and friend (and, for that matter, being a bad one), for breathing good air and for inhaling a bad one. We sometimes pay a price for our words or even thoughts. We can pay with our life for our beliefs. The price we pay can come in the currency of poor health, gray hair, wrinkles, and neuroses, in addition to money. We pay because we agree to or because we don't have any choice. There is one currency even more powerful than money: violence. Our courting and mating is pure negotiation with emphasis on advertisement and packaging, with most content borrowed from animals.

Freedom is commerce.

American history clearly points to the commercial roots of American Independence. It all started around taxation without representation and freedom of tea trade.

Personal freedom means that nothing and nobody interferes with the process of negotiating a price. This is not always possible: oppressive systems have their preferences overriding personal ones, and even in a free state the government tends to impose regulations. Systems with limited freedom set artificially fixed prices. The law of the land does not forbid crime—it is impossible to forbid it —but simply sets the price for some transactions, in the currency of both violence and money. Thus, the Babylonian codex of Hammurabi, almost 4,000 years old, records the following rates:

25. If fire breaks out in a house, and some one who comes to put it out cast his eye upon the property of the owner of the house, and take the property of the master of the house, he shall be thrown into that self-same fire.

53. If any one be too lazy to keep his dam in proper condition, and does not so keep it; if then the dam break and all the fields be flooded, then shall he in whose dam the break occurred be sold for money, and the money shall replace the corn which he has caused to be ruined.

196. If a man put out the eye of another man, his eye shall be put out.

198. If he put out the eye of a freed man, or break the bone of a freed man, he shall pay one gold mina.

199. If he put out the eye of a man's slave, or break the bone of a man's slave, he shall pay one-half of its value.

200. If a man knock out the teeth of his equal, his teeth shall be knocked out.

201. If he knock out the teeth of a freed man, he shall pay one-third of a gold mina.

202. If any one strike the body of a man higher in rank than he, he shall receive sixty blows with an ox-whip in public.

I cannot accept the definition of freedom as the right of individuals to act as they choose. This is a dangerous misconception.

Does a non-tenured university professor have freedom of speech in the sense that he or she is free to express any view? By no means. Even the tenured one does not. The decision to speak up would include a careful imaginary negotiation with the locally existing notion of political correctness, the unwritten codes of local Hammurabies, and the chances of a heart attack . If the price is too high, very few people will enact their freedom.

If somebody violates the law, is this act of freedom? Not always, because people can be driven by their animal nature and uncontrollable instincts.

Complete freedom of any action is possible when the individual chooses between two exchanges of approximately equal value. We would not crave for such freedom. The story of Buridan's ass that died of hunger between to equal loads of hay, known to most shoppers as the predicament of choosing between two equally attractive things, or to young people as the problem of a belle torn between two beaux contenders of equal stature seem to significantly devaluate the pure 200 proof freedom of choice.

What we mean by freedom is freedom of trade. America is free because the freedom of trade, business, and negotiation is almost absolute. Be it so everywhere, would political system matter?

Communism in Russia abolished the free trade and substituted the state monopoly for it. If Communism did not go as far as to abolish private property, it would have a good chance to be accepted into the world community from the very beginning, and, as a matter of fact, the acceptance started with the increase in trade in the 60's.

What follows from my understanding of freedom is the acknowledgement of our debt to Things. We owe our freedom to black pepper, rubies, and indigo, as well as to telephones, cars, and airplanes. As soon as the society became involved into making Things for trade, the price of life went up: a man was worth his life (not much during most of human history) plus his possessions (Things) plus his muscles (to make Things) plus his mind (to get Things done) plus the future interest on the total of the above.

Under such circumstances, it was often more profitable to trade than to wage war.

Making Things, this demeaning, noisy, exhausting, boring, polluting process, has been the best peacemaker. Napoleon, Hitler, and Stalin came to power in the countries where business activity was in shambles as consequence of revolution and war. Poverty and underdevelopment remain the breeding grounds for war, revolt, and political instability.

The paradox is that our freedom, which is freedom of trade, will never be complete until we are free of trade. We are being enslaved by the freedom-bearing trade, Things, noise, and money. This is a sweet, dizzying, and breathtaking slavery, but we might change our perception with time.

To be free means to be free of freedom: not to crave it, not to need, and not to dream about it.

What is happening with us is the same what had happened to domesticated animals: they have lost their freedom to the humans who can be both caring and cruel.

Are there any laws of nature, not those of Hammurabi, to understand all that? What's next? How can freedom/nonfreedom evolve after the present stage? It is a convenient copout to end an essay with a question. I'm taking the Fifth for the moment.

To answer a question of this magnitude needs some understanding, not knowledge, because we can never **know** the future. I will try to build the lower floors of this understanding in my subsequent essays. Essay, as Montaigne designed it, is a tool for understanding. About the difference between knowledge and understanding, see **Essay 20.**

Here I am leaving a hint. There are physical parameters that can be defined only in terms of their opposites. For example, order is absence of chaos. Chaos is absence of order. In fact, chaos and order are like heat and cold, light and darkness: they cover a certain range of a property that has two equally usable names signifying the opposite extremes of the scale and they can exist in their extreme forms only in our imagination.

Complete freedom from this angle looks as the problem of the Buridan's ass (see **Essay 8**) with two equal armfuls of hay. Complete non-freedom is just one armful of hay. If there is anything worse than complete freedom it is no hay at all.

I believe my view of freedom resonates well with the commercial spirit of our time. Make hay, not war.

2001

Essay 4. On new overcoats

[inflation, competition of humans with things]

Today the masses turn for their well-being not to the face of a god, king, dictator, or national savior but to the faceless substance of economy acting like climate, weather, and the roar of the earth. It is a new ecumenical paganism. The words interest rate, inflation, stock market, and unemployment carry even more weight than hurricane, storm, drought, earthquake, and epidemics. Like the old readers of *The Old Farmer's Almanac* we search our financial skies for signs of changing weather because we are all farmers in the third millennium: we grow money.

Economy is now part of global human ecology. As we all know something about stormy weather not just from textbooks, we are all entitled to a personal opinion on economy.

The primordial chaos of economy, the *tohu vebohu* , "without form and void" of the second verse of Genesis, calls for somebody to say "Let there be light." The function of Federal Reserve is to keep inflation in check. This is done by slowing the economy, increasing unemployment, and strangling the stock market where the soil for farming money is the most fertile.

To some people it seems natural. To others, including myself, it is irrational. How can we slow down the economy if our entire survival depends on it? We will have to resurrect tomorrow what we have killed today. Why not to slow it down forever, or open way to the natural course of Things and the **invisible hand**?

I am not interested in economics *per se*. I am no expert. By no means do I want to criticize anybody's policy. I have no recipe. I am just a metaphor hunter. In search for metaphors I look for the secret meadows where they grow.

Irrational does not mean wrong. It is something neither true nor false, or both. According to Niels Bohr, one of the greatest experts on the laws of nature,

> "If you have a correct statement, then the opposite of a correct statement is of course an incorrect statement, a wrong statement. But when you have a deep truth, then the opposite of a deep truth may again be a deep truth." (see **Essay 8**)

Niels Bohr was one of the creators of the quantum physics, a science that has always looked rather irrational not only to laymen but even to Albert Einstein but still holds as a deep truth.

Industrial Revolution started about 200 years ago. A sharp increase of inflation was recorded somewhere around 1960-1965. We can see it growing since the end of WW2. Something happened at that time.

This needs an explanation. If the productivity grows, everything should be less and less expensive. This may be true only until the resources of matter and energy are not close to exhaustion. Even today, however, the resources seem plentiful. If we pay more and more for our own existence, what are we paying for?

We have to look at our society and economy from afar to search for a major difference between the current historically short period and the preceding long one. And sure enough, the difference is there.

My explanation (irrational, rather than rational) is that inflation is what we pay for the existence of man-made Things that begin to live a life of their own.

The price of bread could be stable or fluctuate around an average if all the grain was grown, ground, and baked by humans and horses. Their output of physical energy was determined by biology. Using selection, we can significantly, but not endlessly, increase grain yields, production of milk by cows and eggs by hens, but unless we have a radically new breed of humans, we cannot expect more work from them. Physical evolution of species seems to be almost as slow as the evolution of climate or continental drift.

Not so with Things. The Industrial Revolution was only the beginning of their evolutionary explosion. It opened new non-biological and non-renewable sources of energy—coal, oil, and gas. That energy was spent by industrial societies on making consumer products, means of their manufacturing and transportation, and means of their military protection and promotion.

The seeds of Things are their ideas.

WW2 for the first time shifted the social function of science from the quest for truth to the quest for production. Before that science was something like art and scientific ideas were valued for their uniqueness, beauty, depth, and potency to conceive other ideas . Science became an industry of knowledge, part of economy, branch of business, and an incubator of Things and ideas for sale. If Things fathered by science multiplied, the profits percolated back to science. Scientists multiplied. Sciences multiplied. Not only that, but with each new decade, the scientific landscape could change beyond recognition. It seemed like a new breed of scientists, their instruments, and theories is being created on daily basis.

While ideas of Aristotle, Darwin, and Einstein had no owner, ideas today are products for sale and they better be kneaded and baked quick. A private or public company for developing scientific ideas in information processing, biology, chemistry, and even mathematics is common today.

The intellectual capacity of human brain changes as slowly as human physical capacity. The intellectual production was increased by the Things in the form of scientific equipment and computers. Another large cycle of socio-economic metabolism closed: the gears of business engaged with the gears of science. That was the essence of the big evolutionary event of the 60's, the phase 2 of the Scientific Revolution, catalyzed by the cold WW3 more than by anything else.

As result of the Scientific Revolution, enormous amount of Things was created—not only individual Things, but also their species, genera, families, orders, etc., up to new kingdoms, like TV, computers, and satellites.

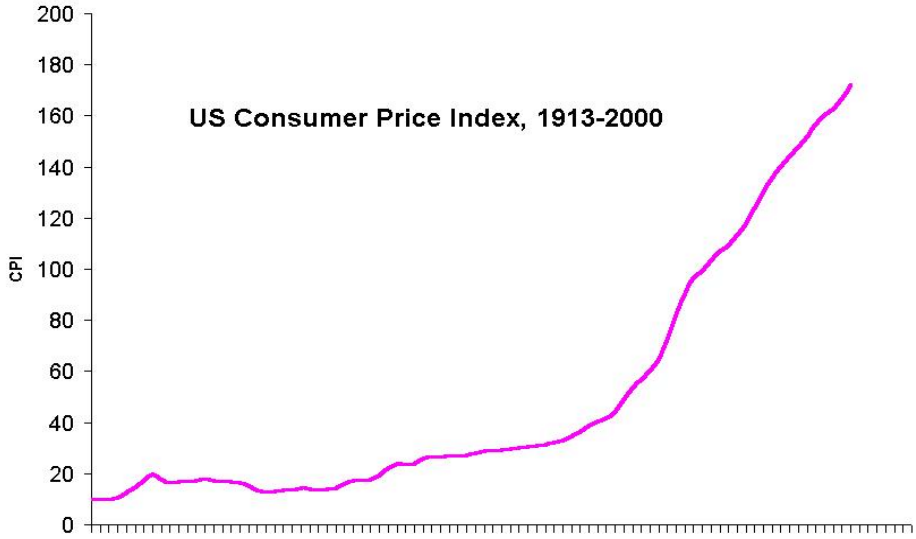
All this techno-life (Technos, as I would call it) had to be fed with energy, installed, inspected, repaired, disposed of, and exchanged for new and improved species, genera, families, etc., as well as advertised, promoted, sold, insured, and defended from the competing species, genera, families, etc., and provided with well paid, qualified, educated, healthy humans to run all that. Moreover, science and industry could now manufacture and package human health in quantity and quality unheard of before. That was a product of unlimited demand, so that more qualified, educated, etc., etc., ... to oversee species, genera... etc., etc.

While Things raised productivity—which has been a major justification for their invasion—they acquired a remarkable property of brevity of life. Each new invention and improvement made them obsolete within time essentially shorter than human life. Old Things had to be dumped because old age became a liability for both humans and new Things. The Things lost their traditional resale value. Some very old Things went up in price, but only if they had been practically extinct.

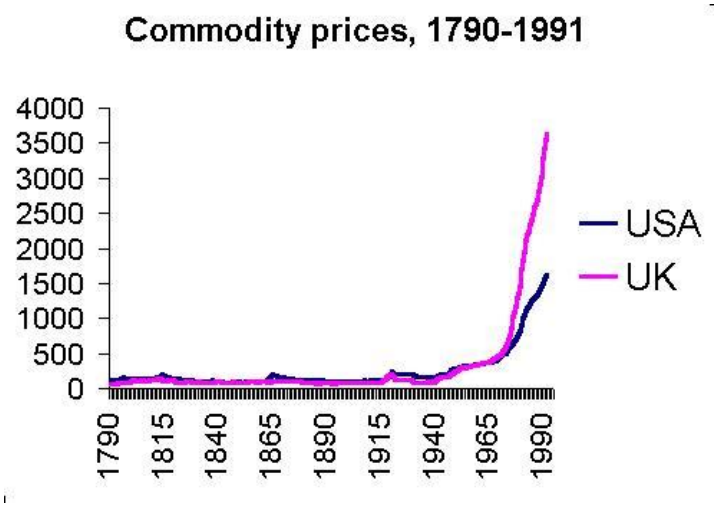
As result, we have some curves that follow. Whether people in America are healthier, more satisfied with life, have more comfort, security, and luxury, I cannot tell because I have no such data, but I suspect, that the answer is positive. I do not think there is a decline in general degree of happiness over hundred years. Still, it would be interesting to find out. It is much easier to find some economic data over surprisingly long periods of time.

One can find on the Web a calculator to compare prices for years from 1940 to present. A computer for $1000 could be bought for $100 in 1940. It could be bought in 1913 for $60. It was a fabulous life, a Golden Age! Can we revert the time?

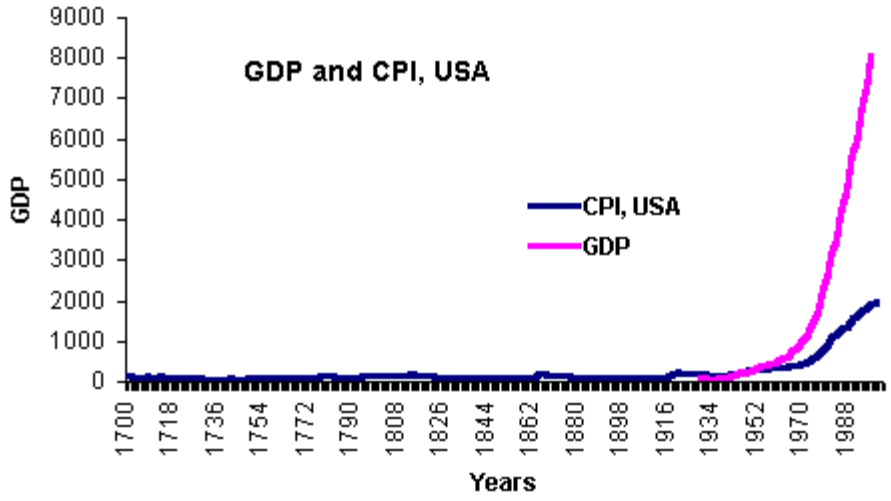
The following figure presents consumer price index in USA since 1913 (source of data).



The picture looks even more dramatic if we take a larger period. The commodity prices, available for UK since 1600 (source: John J. McCusk, *How Much Is That in Real Money?* American Antiquarian Society, 1992. I had found the tables on the Web, but lost the link and could not find it again) can be taken as surrogate inflation data. The next chart shows them for the period 1790-1991, and believe me, they were practically stable in UK before that: 34.9 in 1600, 66.3 in 1790. They did not even double in almost 200 years and I thought they weren't worth plotting,



The jump of inflation coincided with another jump: in gross domestic product, GDP.



So, what was that "something" that had happened around 1965?

I believe it was the evolutionary explosion of the life of Things who (of course, *who*) invented a radical improvement in their mechanism of self-reproduction: industrialization and commercialization of science. They started to distance themselves from humans and use them as their own reproductive apparatus. This brings us back to Samuel Butler (see **Essay 6**) who predicted all that as soon as he had learned about Darwin's theory.

Humans, with their chaotic nature, were an excellent source of mutations for the blueprints.

After the Industrial Revolution, and especially after the 1965, economy and society found a new environment, free of restrictions of human biology. Humans believe that Things serve people. In fact, the opposite conclusion is equally true: humans serve Things. As I believe, we have here a typical Niels Bohr situation.

> **NOTE:** What else happened after 1965, see Robert B.Reich, *The Future of Success.* The idea about humans serving Things as their reproductive apparatus is almost 150 years old and is a topic of **Essay 6**.

As I see it, the modern inflation is part of our wealth dissipated by Things we make. It is our work, resources of mineral energy, personal time, and savings that we spend on the life of Things and not on our own biological needs, i.e., what we need today to be alive and well tomorrow. There is a small problem: the Things do not ask us for an invitation. The entire system of government, law, and business, at least in USA, is based on a monumentally strong pro-life (for Things) paradigm.

If the Industrial Revolution brought to life the Things making Things, the Revolution of 1965 brought to life the industrial production of the ideas preceding Things, the Things making ideas, and the ideas behaving as Things. Ideas became commodity and became engaged in the socio-economic metabolism similar to any business.

But don't ask me whether I think the Federal Reserve is good or bad. I am even ready to admit that the **visible hand** is always better than an invisible one because you can at least slap on it.

Our own actions of our free will can be good or bad, judging by the comparison of goals and results. They could be good or bad from the point of view of an ideological canon, such as religion or Marxism. Curiously, for the results of our dedication to either one we would need to wait until we were dead. But in the twenty-first century, we do not have any free will anymore. The measure of our free will is a number between zero and one, with zero being the degree of free will of the enzymes that assemble our own proteins and nucleic acids. Slaves had somewhat more free will than enzymes. We are all just enzymes in the global metabolism of Things, like our own enzymes that are busy with our personal biochemistry. We assemble and disassemble Things, ideas for the blueprints of Things, and ideas for their own sake because they sell, too.

Now, where is the metaphor?

In 1842, Nicolay Gogol, a great writer of the nineteenth century, one of a few true immortals of Russian literature, published a short story *The Overcoat*. A lonely timid poor clerk, living on a meager salary, had an overcoat so old and dilapidated that it could not be mended anymore and its owner was a constant subject of jokes and teasing at the office. Finally, with a couple months of fasting and a lucky increase in salary he was able to order a new overcoat for the cold Russian winter.

The downtrodden clerk seemed to have gained a new dignity and respect from colleagues. Same day, however, he was robbed of his new pride on a dimly lit street of Saint Petersburg—the tragedy he could not survive.

> "He saw some mustached men in front of him. "Hey, it looks like my overcoat," said one with a thunderous voice. Akakiy Akakiyevich was about to cry help when another man showed him his fist, the size of a clerk's head, saying "Don't even think about it." Akakiy Akakiyevich felt the overcoat pulled from his shoulders. Hit with a log, he fell face down into the snow and did not feel anything after that."

The literary power of *The Overcoat* is all in fine details, not in its plot. As a metaphor, this story looks to me like a parable of our new economy—by contrast, rather than by similarity. Unlike the Gogol's character, we are not clerks but farmers, some more lucky and gifted than others. The soil of economy brings forth its edible fruit together with its inedible companions because we share the land with Things and they plant their seeds between our feet. Whether we want it or not, we have to till the soil for them. In

exchange, the Things and not food, nor ideas, nor valor are our pride. It is the overcoat that wears us.

Let us celebrate and enjoy our new—only 50 years old—overcoat of many colors and beware of dimly lit streets.

2001

Essay 5. On Medieval America

[quasi-feudalism, evolution of humans and things]

Nothing on earth seems more dramatic than geological transformations: appearance of atmosphere, origin of minerals, waves of changing climate, Ice Age, rise and drop of large areas of land, like in Grand Canyon, and the continental drift. The next in scale is biological evolution: rise and extinction of species. Evolution continues into history where participants are not atoms, rocks, and animals, but every person who ever lived.

Humans perceive their own history through the glasses tinted with human emotions.

In human eyes, very slow processes have an advantage of being predictable. We expect the geography of continents to be practically the same for the next thousand years. Only long after that, North America will divorce South America and join Asia.

Historical change still comes as a surprise within a generation. People who lived in feudal Middle Ages did not know anything about feudalism. We don't know whether the twentieth century would be labeled as Dark or Golden Age. Today we don't see anything gold in the past, just misery, violence and death that overshadow heroism, magnanimity, and devotion.

Middle Ages have a bad fame: dirt, diseases, wars, illiteracy, ignorance, violence, poverty, and enslavement. They were called Middle by the humanists of Renaissance (which means rebirth) because they separated the classic Greco-Roman culture from its assumed rebirth. For a long time Ancient Greece seemed to be the Golden Age and the only way to culture was through studying Classical Greek and Latin. Of course, the Roman Empire and Renaissance Europe had little in common. But the parallel seemed flattering and empire remained an ideal, with trade as possible substitute for military power.

In a sense, everything is Middle Ages between two resonant cultures and everything is a Renaissance of something long gone.

The Ancient World has lost its glitter after the century of the two hot and one cold world wars, but before that, war had been regarded a noble occupation.

After the collapse of the Western Roman Empire, Europe lost the source of order. It was similar to the power outage in an inner city during the night. People lost the sense of security and feared their neighbors. History seemed to get a restart from its Darwinian prehistory. Anarchy and looting took advantage of the darkness of the Dark Ages.

Immediately, a new order started to take shape because its alternative was, most probably, extinction. The only force that could protect and pursue expansion was weapon.

Feudalism was based on a contract between the lord and his vassal, both being legally equal but economically different. The lord granted the vassal land and its protection, while the vassal offered military service to the lord.

Feudalism does not mean serfdom and slavery. Those were features of seignorialism, the system of enforced relationship between the free and the dependent persons, the boss and the laborer on the bosses' land. The two systems perfectly complemented each other because the sides in the feudal contract always wanted to combine it with the advantages of being the seigneur, and thus human emotions and ambitions were bringing the social medium to constant simmer and circulation

Well, it looks like something familiar. The owner or CEO of a company grants the employee more stable and regular means of subsistence than a piece of land can provide. The employee offers professional services to the lord, sorry, owner, whether individual or collective. Both sides are theoretically free and legally equal.

While the boss and the employee are both ruled by the current law, the only way Medieval Europe could have something similar to the unifying laws of the Roman Empire was to have a common boss, named the King. And so Europe became an arena for imperial competition, with more and less lucky contenders none of whom left anything lasting from the current point of view except cathedrals.

It looks like the combination of feudalism and seignorialism has been resurrected (an unexpected Renaissance!) in modern capitalism. To follow all the lines of similarity would take a lot of time, but this is not necessary. I am not going to convince anybody or to prove a point. Anyway, Middle Ages here are just a metaphor. What it signifies is the very natural situation with many bosses wanting to be even bigger bosses and the free employees being not so free in hard economic times. Real freedom is the freedom of being unemployed, and this is something a significant part of the US population cannot afford. It is, probably, different in the most developed European countries.

“Be nice to your boss.” I had heard this advice on TV among talks of recession in January 2001, and it became the initial impetus to this Essay.

Something else comes to mind: “A horse, half kingdom for a horse!”

The same invasions of barbarians and nomads that created the need for the new feudal order made Europeans feel like backward barbarians: the nomads had horses. The horse was the automobile and tank of Middle Ages. In one aspect it was even more advanced than a modern airliner or supercomputer: it naturally reproduced itself with little mental effort on the part of humans, quite like the humans themselves used to do.

Like modern machine, the horse could do a lot of work, but only because it consumed a lot of food. It needed land to graze and multiply. Land, therefore, was like mineral oil today. Automobile is the renaissance horse and gasoline is, actually, a piece of land that immediately becomes useless after a ride. If you wish, it is a three-dimensional land which is consumed slice after slice.

The Picture of Dorian Gray by Oscar Wilde and the earlier *La Peau de Chagrin* by Honoré de Balzac read today as metaphors of the limited nature of land, mineral, and other resources, including time. A piece of shagreen leather in the Balzac's novel had magic powers, but with every fulfilled wish of its owner it shrunk like the value of an oil field . On the contrary, the living nature is, in principle, renewable for as long as the sun lasts, and this is why we have history. Humans are a form of biological life and they can mostly take care of themselves, feeding on natural resources. They can not only own a horse but also be somebody's horse—a commendable versatility.

In the turbulent times of invasions and chaos, however, one needed more than food, clothing, and shelter to survive.

The feudal system took care of the needs of the time by establishing a multitude of contractual relations instead of the unifying rule of Rome. If you want another paradox, democracy is a renaissance of feudalism. Coming after the collapse of monarchy, oligarchy, and dictatorship, it is based on contractual relationships between legally equal individuals.

The lord expected an actual service from the vassal in exchange for the actual land. As soon as money became capable of buying everything, including horse, land, service, and even the position of a boss, the feudalism gradually turned into capitalism. With the pop, sports, and movie stars, we are right in the renaissance of cultural monarchy: we have our royal court and royal jesters.

The difference between the developed feudalism and modern times is that neither the position of lord boss nor the position of vassal employee is legally inheritable, and if it is, then only as exception and coincidence.

The parallel between modern capitalism and early feudalism extends also over the phenomenon of fragmentation: the number of companies is, probably, not dramatically larger that the number of European principalities or manors after the beginning of the feudalism: they were counted by thousands. Today a powerful force drives the process of consolidation of business principalities into industrial and financial empires, as it was in times of Charlemagne and Holy Roman Emperor Charles V. Bill Gates and George Soros

have demonstrated power largely exceeding the power of an average size state. True, another force crumbles them.

Here I am interested only in one question. Suppose, there is a parallel between feudalism and modern capitalism. We know that feudalism evolved into capitalism. What can come out of the modern quasi-feudalism? What could future historians write about our times? Can we know today what is going on with us in terms of the future perspective?

This question is as irresistibly attractive as all the useless questions that have been driven the human imagination—mostly, childish—for ages. To ask such questions means to be forever immature—a substitute for eternal youth.

The previous discourse implies that our times will be interpreted differently, depending on the contemporary environment of the historian, but facts could better resist the winds of time than interpretations.

Here is what I would write in 2300 about the year 2000.

The entire period of 1000-2000 shows a consistent trend. In 1000, the main problem of a human was to stay alive and take care of the progeny. By 2000, the main problem of society was to keep Things in the process of self-reproduction and evolution. In exchange, Things took care of human health, reproduction, well-being, transportation, entertainment, and means of subsistence—not everywhere, of course.

From 1800 to 2000, the Things underwent an explosion in diversity greatly exceeding that of the Cambrian Explosion, about 500 million years ago, when complex organisms with hard structures such as shell and calcium carbonate skeleton appeared. It was the first great revolution since the birth of Things in the hands of *Homo Habilis*.

As with all our fundamental concepts, we have here a circular definition: *Homo Habilis* is a Thing-making primate, our evolutionary ancestor. The Things (i.e., man-made objects) did not exist before humans. They are objects made by humans, starting with *Homo Habilis*, tool-making human ancestor. This kind of logical circle happens all the time when both concepts are just two sides of a coin. Things have accompanied Thing-making humans since their twin birth about 2 million years ago. The first known Things were tools, i.e., Things for making other Things, such as stones given a particular shape by striking against other stones. For 2 million years, the tools and all the Things were made either by bare human hands or with other natural or man-made object held in human hands. The humans controlled every step of the process. The making of a Thing was limited by the abilities of a human, so that tools were nothing but extensions of human hands.

Human hands have an important counterpart in the very foundation of life. They work as enzymes, which is more than just a metaphor. The function of an enzyme is to assist in assembling or disassembling parts of a biologically important molecule. An enzyme briefly sticks to different spots on the same molecule or to two different molecules and

either separates or joins them, using the same reversible mechanism for both opposite actions .

The enzyme has neither brain no muscle. It works because it increases the probability of an event that can occur without enzyme's intervention only with low or negligible chances.

Chemical reaction is somewhat like sex. As was codified by Kama Sutra, the couple has to take a certain type of position to perform it, with most other possible positions leading nowhere. Same with molecules, especially the big ones. Molecules, however, are madly dashing all around so that an accidental collision of two of them in exactly the necessary position for reaction is highly improbable. Enzymes fix them in such a position, very similar in nature to human hands holding a nail and a hammer on the right spot, and as soon as the position is taken, only a short time is needed to complete the act.

Hands are the social enzymes of humans. Conversely, enzymes are molecular hands of life.

What preceded what, enzymes or other proteins and nucleic acids? This is the same question as what came first, the chicken or the egg, *Homo Habilis* or his tools.

The Industrial Revolution that happened around 1800 consisted in the appearance of Things making Things with productivity greatly exceeding that of humans. With a power loom, fabric could be woven without human touch for extended periods of time. Tableware could be stamped out by millions. Clothing was sewn with machines fed by human hands. Rail was rolled out with only an occasional human touch. An entire big class of new machines was no good for immediate human use: their only function was to make other Things.

With the Industrial Revolution, Things made the crucial first step toward their own biology. Moreover, the very term biology became split: life of Things and life of species, as well as life of societies, found a joint umbrella in meta-life—the way of existence of complex objects through evolution, coding, mutation, and selection, for which the reader should consult a future course of meta-biology.

Things making Things are like molecules making molecules and, with the current progress of molecular biology, like humans making creatures other than themselves. We can only guess what kind of natural hands had made the first enzymes and their substrates, but those hands stepped back into shadow since. Some scientists, for example, believed the primeval hands to be particles of clay.

The Industrial Revolution had at least three dramatic consequences.

First, it elevated the social value of educated and qualified humans capable of handling and directing machines. Such individuals became themselves being stamped out by public and private education in millions of copies. The social status of former slaves,

peasants, crude enzyme-like laborers, and cannon fodder changed into the status of attendants of machines and their blueprints—the DNA of Things. The blueprints became digital by 2000, which was yet another radical step of Industrial Revolution.

Second, it generated a mass production of Things in numbers exceeding the demand for them. Things multiplied like bacteria and rats. Things, therefore, became involved in the same Darwinian evolution that produced the entire variety of life on earth. They had to struggle for existence of their species. They were coded in descriptions of their technology like cookies in kitchen recipes.

Third, it democratized the society because everybody became a consumer, a respected member of society capable of buying Things, and, therefore, supporting the existence of the Thing-making human neighbors. Humans had to be produced and pampered (and not just killed by war, hunger, and epidemics) in order to make Things. Things needed huge resources of energy and ingenuity to compete for the attention of humans. They acquired bright petals, fragrance, as well as barbs, fangs, and claws.

All that had some secondary consequences.

The value of human life now included all the Things he or she possessed, all the education, and all the health care needed to keep a consumer (and enzyme) in good shape. No wonder, it skyrocketed because swarms of short-living Things now had to serve a single human and die afterwards or be bought for a penny at a yard sale. Everybody became a king, but some were more royal than others.

The entire culture became standardized and globalized because all Things knew man as the only god and all spoke the same language of electronic files. They knew no borders and no other bad blood between themselves that could be remembered after the daily closure of the stock market.

Money, which became a currency of energy, bringing the wheels of meta-life into motion at all levels, turned into a truly ecumenical religion uniting humans and Things.

Make more Things for less money! Sell less Things for more money! Buy more Things for less money! Those were simple commandments of meta-life.

The essence of the new contract between humans and Things, embodied in the laws of the land, was that Things, through corporations, granted the humans (who by that time lost the ability to feed and clothe themselves from the fruits of the land) protection from hunger and premature death in exchange for the physical and intellectual service offered by humans to Things.

It looked only on the surface that capitalism was driven by money: it was driven by Things. People could hardly see it because Things were represented by the same governments as humans, elephants, and whales, while money in private pockets was not represented by anybody but its owners.

It was a renaissance of feudalism, and the same laws of nature that brought to existence national states by 1500 had now to drive history toward a new economic geography having little to do with the shape of continents and distance between them.

But was there a new Industrial Revolution?

Yes, it was: the Intelligent Revolution of 2100, when Things got their brains and surpassed humans in autonomy and intelligence.

In 2300, the equality of Things and humans was legally recognized and the new hyper-racial status of Things was reflected in the capital T of their name. The racial relations are not typically harmonious. They are harmonious when there are no races. Each time I was asked to indicate my race in an official form, I was reminded about that.

……

Here I must stop because I cannot predict a distant future from the position in an even more distant future. This would mean the loss of connection with the present. It is a forbidden trick. I have to keep at least one foot on the firmer ground of the present.

From this point on, the future historian would continue differently, depending on whether the year of 2000 was regarded as golden or dark age, whether human-enzymes (called derogatively *huzymes* by Things) stepped back into the shadows of history by that time, whether humans (or Things) cursed or blessed their new place in the kingdom of meta-life, whether Things treated humans as serfs, whether the historian itself was a Thing, and whether humans (or Things) finally restored democracy (for themselves).

By no means am I a pessimist. Watching the process of humans taking care of and representing animals, forests, and pristine land, I believe that sooner or later Things would take care of humans, whatever happens to the latter. Anyway, we all have only one meta-life to live.

The course of our history, from the point of view of the most basic laws of nature, ultimately depends on the sources of energy. When the *peau de chagrin*, the Balzac's leather of mineral resources, shrinks to a microscopic size, Things will have an enormous evolutionary advantage over humans. Things, from solar calculator to computer, can consume very little energy, they don't need a narrow interval of body temperature to exist, and they do not need to gallop all around the world. They can even reduce themselves to molecular level and start evolution anew. The only alternative for humans would be either becoming more like plants and animals and live on renewable sources in ecological balance, or becoming more like Things, which is not that bad, taking to account that Things have the infamous brevity of life only because they have to cater to humans. Of course, humans could revert to the virtues of the Golden Age, whatever would be meant by that at the moment.

Are there any signs of the future today?

In any industrial society, Things and children compete within the household. The more Things, the less children, as an average.

The Industrial Revolution was preceded by the explosion of people driven off the land and migrating into cities as paupers and workforce. People and sheep competed for the land because sheep provided a valuable Thing: wool. The sheep won, for a while. Modern family presents a landscape where children and Things are in a tug of war. Things are extensions of human hands no more. They enter their own capitalism where humans are bulky, cumbersome, expensive, voracious, moody machines that stubbornly refuse to evolve by the day, not by millennium, stupid horses they are.

And this is why some humans, more equine than others, begin to revolt and gallop all around the world, raising Cain.

2001

Essay 6. On the Yahoos, or Apologia of Samuel Butler

[Samuel Butler, Norbert Wiener, competition of humans and things, coevolution, technology]

New ideas are conceived and born out of sight, like babies—or crimes. When they grow up and mature, some of them come into the limelight in full glory. Like political leaders, pop stars, and lucky criminals, they capture imagination of large masses of people. In the pre-tech past, the leader, the prophet, the champion seemed to be an embodiment of his idea, a puppet driven by an invisible spiritual hand. In the post-education present, ideas can quietly percolate through massive layers of former high school graduates. This can happen with all kinds of ideas, from esoteric scientific ideas, like nuclear energy and genetic engineering, to less obscure global warming and loss of personal privacy.

The ideas of mass origin usually develop into reform or revolt. Obviously, when many people were dissatisfied by the existing regime in France by the end of the eighteenth century, the revolution followed. Same can be said about the pre-revolutionary North American colonies. Similarly, many people in America link the juvenile violence to the cult of violence in the entertainment, although neither revolt nor reform are in sight. Such ideas are simple to conceive or stumble upon: we pay taxes, and they don't, therefore... They are represented in matters of taxation and we are not, therefore... They are violent, their movies are violent, therefore... etc. Many people observe life and many come to the same conclusion, which may be or may not be true. Such ideas have bright colors, spin in the air, and rustle under the feet like October foliage.

Other ideas are born in one or a few minds out of contemplating a reality that most people don't encounter and don't care about other ideas. The visionary is not necessarily a genius: he might have seen through the keyhole of the microscope what common people could not for the lack of instrument. His idea has to wait some time until its underlying reality develops through technology and politics to such extent that it reaches the surface where everybody can see it and have a private judgment.

Ideas evolve, diverge, fuse, and crossbreed, like organisms. After Richard Dawkins' meme, it is habitual to regard ideas as a form of life, although the study of their genealogy had been popular long before (one can try an in-depth site about memes) . The life and evolution of ideas about life and evolution must be a curious detective story without a solution—and it is.

In my opinion, one of the most unusual root ideas throughout the entire history of human thought was the evolutionary theory of Charles Darwin, first published in 1859. The tree

supported by the old roots is still growing, and axes of critics are still getting blunt while hitting the trunk.

Today the idea of evolution is not limited by the plants and animals: it is a very general, actually, universal principle well beyond the realm of biology. Paradoxically, the basic Darwinism is still struggling for the acceptance of conservative mind, at least in the USA, and has opponents and skeptics even among specialists. There are profound reasons for that and the apparent incompatibility with the centuries and millennia old religious, ethical, and cultural traditions is only one of them. This is all the more strange that whether we believe in evolution or not is totally irrelevant for our everyday life. As global practice proves, so is the choice of religion.

The general idea of evolution is neither about the past nor about the future. We can learn very little from it about the present. It is about the mechanism of transformation from past to future—quite a limitless range, like the world ocean. When it stirs imagination, the mental storms are reluctant to calm down. In 1859, some minds got excited immediately.

A simple but far-reaching extrapolation of Darwin's idea was first expressed as early as in 1863 by Samuel Butler (1835-1902) in a letter to the New Zealand newspaper *Press*, entitled *Darwin among the Machines.*

Who will be man's successor? To which the answer is: We are ourselves creating our own successors. Man will become to the machine what the horse and the dog are to man; the conclusion being that machines are, or are becoming, animate.

Samuel Butler developed his idea in three chapters of his widely published, known, and referred to *Erewhon* (1872), which is hard to tag as either utopia or anti-utopia, although its title points to utopia, i.e., nowhere. Most other chapters are a satire, sometimes very biting, of the Victorian England, but the three chapters that the author presents as a digest of *The Book of the Machines,* written by an Erewhonian professor about the reasons for the abolition of technology, certainly look neither ironic nor satiric today. They are remarkable for their hauntingly modern tone and somber logic.

Whether Samuel Butler really saw the evolving machines as a challenge to humans or put Darwinism to test by *reductio ad absurdum*, does not actually matter. He presented in *Erewhon* his ideas with intense and eloquent clarity. They have been living a life of their own since, and the explosions of the Unabomber's contraptions, as well as the raucous anti-globalization demonstrations, were their distant repercussions.

For decades Butler was obsessed with his mental discovery but it seems that he was ambivalent about it, as well as about Darwinism, and the idea was unsettling for him.

Did Butler seriously recommend the destruction of technology? He seemed to avoid complete seriousness and logical consistency, enjoying ideas as they are, in a Zen-like manner (see the biographical sketch written by his friend Henry Festing Jones).

The machine Darwinism was for him like a mathematical strange attractor and his mind, probably, was making a round after round over the idea, incapable of coming to a stable position and never exactly repeating the previous trajectory of thought.

Anyway, in his *Erewhon Revisited (1901)*, the laws against machinery are already repealed, resulting, of course, in the spread of materialism. Thirty years after *Erewhon*, it was the time of telephone, motion pictures, and first automobiles, the time of big expectations.

Darwinism is like astrophysics: both have the magnetic appeal of impossibility of proof. Although based on hard experimental science and supported by a train of new discoveries, both could have the final proof only beyond the temporal limits of human existence. Same is true about futurology in general. Once you are there, on the platform of you premise, you are doomed to wander from one edge to another, see attractor.

Here are some examples of Butler's ideas.

1. We see machines evolving so fast that the path of their evolution may cross someday with that of the humans.

> But returning to the argument, I would repeat that I fear none of the existing machines; what I fear is the extraordinary rapidity with which they are becoming something very different to what they are at present. No class of beings have in any time past made so rapid a movement forward. Should not that movement be jealously watched, and checked while we can still check it? And is it not necessary for this end to destroy the more advanced of the machines which are in use at present, though it is admitted that they are in themselves harmless?

2. Machines tend to exceed man in many functions.

> And take man's vaunted power of calculation. Have we not engines which can do all manner of sums more quickly and correctly than we can? Our sum-engines never drop a figure, nor our looms a stitch; the machine is brisk and active, when the man is weary; it is clear-headed and collected, when the man is stupid and dull; it needs no slumber, when man must sleep or drop; even at its post, ever ready for work, its alacrity never flags, its patience never gives in; its might is stronger than combined hundreds, and swifter than the flight of birds; it can burrow beneath the earth, and walk upon the largest rivers and sink not.

3. The human control over machines may not be sustainable in the future. The machines may control the humans.

> We treat our domestic animals with much kindness. We give them whatever we believe to be the best for them; and there can be no doubt that our use of meat has increased their happiness rather than detracted from it. In like manner there is reason to hope that the machines will use us kindly, for their existence will be in a great measure dependent upon ours; they will rule us with a rod of iron, but they will not eat us; they will not only require our services in the reproduction and education of their young, but also in waiting upon them as servants; in gathering food for them, and feeding them; in restoring them to health when they are sick; and in either burying their dead or working up their deceased members into new forms of mechanical existence.

And yet:

> Some people may say that man's moral influence will suffice to rule them; but I cannot think it will ever be safe to repose much trust in the moral sense of any machine.

4. The machines have the ability to manipulate the humans.

> ...they [machines] owe their very existence and progress to their power of ministering to human wants, and must therefore both now and ever be man's inferiors. This is all very well. But the servant glides by imperceptible approaches into the master; and we have come to such a pass that, even now, man must suffer terribly on ceasing to benefit the machines.

> Man's very soul is due to the machines; it is a machine-made thing: he thinks as he thinks, and feels as he feels, through the work that machines have wrought upon him, and their existence is quite as much a sine qua non for his, as his for theirs.

> So that even now the machines will only serve on condition of being served, and that too upon their own terms; the moment their terms are not complied with, they jib, and either smash both themselves and all whom they can reach, or turn churlish and refuse to work at all.

5. Machines can be as autonomous as organisms.

> The main point, however, to be observed as affording cause for alarm is, that whereas animals were formerly the only stomachs of the machines [like plough], there are now many which have stomachs of their own, and consume their food themselves. This is a great step towards their becoming, if not animate, yet something so near akin to it, as not to differ more widely from our own life than animals do from vegetables.

6. Man is part of the reproductive system of machines .

> Surely if a machine is able to reproduce another machine systematically, we may say that it has a reproductive system. What is a reproductive system, if it be not a system for reproduction? And how few of the machines are there which have not been produced systematically by other machines? But it is man that makes them do so. ... Does anyone say that the red clover has no reproductive system because the humble bee (and the humble bee only) must aid and abet it before it can reproduce? No one. The humble bee is a part of the reproductive system of the clover. Each one of ourselves has sprung from minute animalcules whose entity was entirely distinct from our own, and which acted after their kind with no thought or heed of what we might think about it. These little creatures are part of our own reproductive system; then why not we part of that of the machines?

7. The machine has a reproductive system distributed in the society.

> We are misled by considering any complicated machine as a single thing; in truth it is a city or society, each member of which was bred truly after its kind.

> The truth is that each part of every vapor-engine is bred by its own special breeders, whose function it is to breed that part, and that only, while the combination of the parts into a whole forms another department of the mechanical reproductive system, which is at present exceedingly complex and difficult to see in its entirety.

8. The machines are extensions of human organs.

> Man, he [the Erewhonian author] said, was a machinate mammal. The lower animals keep all their limbs at home in their own bodies, but many of man's are loose, and lie about detached, now here and now there, in various parts of the world--some being kept always handy for contingent use, and others being occasionally hundreds of miles away. A machine is merely a supplementary limb; this is the be all and end all of machinery. We do not use our own limbs other than as machines; and a leg is only a much better wooden leg than any one can manufacture.

There is much more in the original. The above quotations are not a substitute for the complete text. *Erewhon* is a short book and Chapters 23-25 are only a small part of it.

Samuel Butler, probably, had predecessors, but there was too little time between 1859 and 1863 to have many of them. I can feel in his text the freshness of the first discovery. I accidentally discovered Butler only very late, after I myself had already arrived at the gate of the same mental enclosure, some would say, trap. I might have even read Butler in my youth in a Russian translation, but it left no impression.

The amazing book that drew my attention to Butler is also worth mentioning: *From Dawn to Decadence* by Jacques Barzun, a history of the last five centuries of the Western culture, a book unlike anything else in this overcrowded domain. By the way, it ends with some intriguing futuristic prognoses echoing H. G. Wells.

At least two other writers, Henry Thoreau and Ralph Waldo Emerson, who, like Butler, witnessed the genesis of modern technology, had definite reservations about it.

> The horseman serves the horse,
> The neatherd serves the neat,
> The merchant serves the purse,
> The eater serves his meat;
> 'Tis the day of the chattel,
> Web to weave, and corn to grind;
> Things are in the saddle,
> And ride mankind.
>
> There are two laws discrete,
> Not reconciled,—
> Law for man, and law for thing;
> The last builds town and fleet,
> But it runs wild,
> And doth the man unking.
>
> Ralf Waldo Emerson,
> *Ode Inscribed to W. H. Channing*

> "And if railroads are not built, how shall we get to heaven in season? But if we stay at home and mind our business, who will want railroads? We do not ride on the railroad; it rides upon us. "
>
> Henry David Thoreau, *Walden.*

Emerson (1803-1882), most probably, read *Erewhon*, but Thoreau (1817-1862) could not.

Butler, Thoreau, and Emerson lived in the times when mechanical technology was as new and emerging as the computers and Internet for our generation. Moreover, they lived in USA and Britain, right on the breeding grounds of technology. All generations that witness the emergence of a new social factor are split about it, but those who are born with it take it for granted. It is all the more intriguing that after 150 years Darwin and Butler still teas and stimulate human mind.

There is a new version of the same idea, apparently, independent, see NOTE.

The train of books referring to Butler's ideas is endless. The most significant recent work is *Darwin among the Machines* by George B. Dyson. It is not only directly influenced by Butler but repeats the title of his original essay. Another significant view was outlined by Sir Peter Medawar.

A wide range of opinions has sprouted up today on the plat of mental land first tilled by Samuel Butler. It is still big enough for anybody to drop a seed.

I do not believe in any Luddite assault on technology. I believe, though, in the war of humans against the species of technology that take away their freedom and privacy—the war in which humans are the most likely losers. I believe that we live in times of a starting divergence between the evolutionary branches of man-made Things and humans. Divergence means competition.

Emerson, unlike Butler and all subsequent detractors of technology, did not mean technology *per se*, but the Things in general, i.e., the objects of manufacturing and exchange. This seems the most general approach to the evolution of a society that is not exclusively human anymore. By the Things I mean everything for sale, including cars, food, hotel services, movies, government (meaning not corruption but the fact that we pay for it), and even ideas that are becoming Things because of ever widening concept of copyright. Even our personal data and preferences are becoming Things for sale when we disclose them to companies in exchange for some miserable benefit.

Humans legally represent Things, like the abolitionists represented the slaves, parents represent children, and special interest groups represent whales, redwood trees, guns, breast, and colon.

I believe that the humans are shifting toward performing the same role in society as enzymes in the living cell: they assemble and disassemble Things, having very little choice in doing anything else. The details of this vision should better be left to another

essay. Sufficient to say here that Butler anticipated all that and more in Chapters 26 and 27:

> Now it cannot be denied that sheep, cattle, deer, birds, and fishes are our fellow-creatures. They differ from us in some respects, but those in which they differ are few and secondary, while those that they have in common with us are many and essential. My friends, if it was wrong of you to kill and eat your fellow-men, it is wrong also to kill and eat fish, flesh, and fowl. Birds, beasts, and fishes, have as full a right to live as long as they can unmolested by man, as man has to live unmolested by his neighbors.

> Plants," said he, "show no sign of interesting themselves in human affairs. We shall never get a rose to understand that five times seven are thirty-five, and there is no use in talking to an oak about fluctuations in the price of stocks. Hence we say that the oak and the rose are unintelligent, and on finding that they do not understand our business conclude that they do not understand their own. But what can a creature who talks in this way know about intelligence? Which shows greater signs of intelligence? He, or the rose and oak?
>
> And when we call plants stupid for not understanding our business, how capable do we show ourselves of understanding theirs?

Both Darwinism and astrophysics can only add to one's fatalism, and history does not offer any consolation, either. An optimist could say that most of human history was made on horseback but that great innovation did not make us look like Yahoos beside the Houyhnhnms. A pessimist could see instead an exactly opposite picture.

Norbert Wiener's books made a deep imprint on me since the late 50's. His opinion is especially interesting because, like Butler, he not only had witnessed the genesis of a whole new area of intelligent machines, but, in a sense, was their Darwin.

Wiener seemed to be reconciled with technology in general. In his *The Human Use of Human Beings* he shifted the responsibility from technology to man.

> " When I say that the machine's danger to society is not from the machine itself but from what man makes of it, I am really underlining the warning of Samuel Butler. In Erewhon he conceives machines otherwise unable to act as conquering mankind by the use of men as the subordinate organs. Nevertheless, we must not take Butler's foresight too seriously, as in fact at his time neither he nor anyone around him could understand the true nature of the behavior of automata, and his statements are rather incisive figures of speech than scientific remarks. "

Wiener emphasized, however, the machine-like aspect of human society.

> "When human atoms are knit into an organization in which they are used, not in their full right as responsible human beings, but as cogs and levers and rods, it matters little that their raw material is flesh and blood. What is

> used as an element in a machine, is in fact an element in the machine. Whether we entrust our decisions to machines of metal, or to those machines of flesh and blood which are bureaus and vast laboratories and armies and corporations, we shall never receive the right answers to our questions unless we ask the right questions."

He did not seem to foresee a society where not only both humans and machines but also all Things are moving toward emancipation , as Jaques Barzun called the overwhelming trend of the Western evolution for half millennium. They are becoming members of a certain representative republic of all Things, from energy, matter, and land to plants and animals, to humans and all their various social subspecies, to machines and all goods for sale. In this democracy every cog and lever cares for itself and has no loyalty to the machine.

Would that be the right question to ask: if humans and machines are reciprocally dependent, "ride" each other, are components of a single system, and there is a single reconciled law for both (compare with Emerson's "There are two laws discrete, /Not reconciled,—/Law for man, and law for thing;") then who is responsible for what?

As a possible answer, Robert B. Reich in his admirable *The Future of Success* illustrates the inherent dissipation of responsibility in modern economy as *fait accompli*. The book is also a long list of examples of how the Things ride on humans.

It seems like Wiener's train of thought brought up a contradiction: on the one hand, humans are responsible for their destiny. On the other hand, they are used as elements of the social machine, therefore, are the elements of it, and, therefore, are not responsible. The final answer depends on the outcome of the ongoing struggle of the fundamental American and Western individualism with the power of the systemic reality. One might say that in the twentieth century, humans in Russia, Germany, China, and Cuba lost to their systems. The totalitarian system based on one-way domination, however, is not dynamic, i.e., not based on individual reciprocal interactions. The recent history makes the victory of dynamic system over the frozen one look more probable, at least, in the short run.

Today there is a yet amorphous but apparently growing body of people concerned about technology. Quite humanly, they are using the new technology of communication for strengthening the skeleton of their soft body.

Since a confrontation with technology is senseless (we are the limbs of the machines, they are our limbs, we are one body), another evolutionary divergence could be an alternative: the split between the humans that just go with the tide and those who, like the apes, want to stay a step behind and enjoy the primitive pleasures of the "pure" human life where humans trust and represent only themselves. But again, would that be the life at the Walden Pond or a barbarically opulent culture, art, and philosophy mixed with equally sophisticated barbarous cruelty, aggression, and competition? Would the two new races of humans compete like the ancient hominids that happened to inhabit the same territory for a while, leaving only one survivor?

The name of this hypothetic trend, still vaguely visible and unstable, is self-segregation (balkanization, if you will), and if it happened to dominate, history would change its 500 year old course.

I believe that the problem that the humankind faces is not the recent technological inventions. All inventions have always been digested, absorbed, and used with an acceptable degree of risk, like aviation and telephone. The problem is that if plants, animals, humans, their man-made creations, and the creation-made creations form a single global system of mutual dependence, with the wireless nerves of the Web (also anticipated by Samuel Butler!) some organs of this system may change their function, undergo hypertrophy, like human brain, or reduction, like the tail of the hominids. There is nothing to be digested in a single system except energy and matter. Any other digestion will be the self-digestion. Any fight will be self-mutilation, like the LA riots. For the first time in the history of the Earth, population would consist of a single organism not knowing any competition. Why would anybody need a brain then?

For most of history, mere distance, mountain, desert, ocean, language, and historical memories could keep not only human populations apart, so that they could compete (often, a euphemism for murder), invent, exchange, and mimic each other, but also maintain some barriers between the humans and the rest of nature, including the environment and mineral resources. The perspective of a large system with bilateral and reciprocal interactions at all levels would mean the next evolutionary turn on the same scale as the advent of man. Who rides whom—this question would lose meaning. In the 70's oil was riding the USA, and in 2001 it still looks like electricity takes a ride on California.

If it is the system that rides its parts, there is no place for either individualism or dictatorship inside the system.

> What is used as an element in a machine, is in fact an element in the machine **(Norbert Wiener).**

Fortunately, speaking about the future, we cannot prove anything. We have only three choices: to scare, to comfort, and to have fun.

NOTE: Michael Pollan in *The Botany of Desire: A Plant's-eye View of the World* (New York: Random House, 2001; Page *xv*) writes about the relation of coevolution between the gardener and the plants:

> So the question arose in my mind that day: Did I choose to plant these potatoes, or did the potato make me do it? In fact, both statements are true. I can remember the exact moment that spud seduced me, showing off its knobby charms in the pages of a seed catalog.
>
>

> That May afternoon, the garden suddenly appeared before me in a whole new light, the manifold delights it offered to the eye and nose and tongue no longer quite so innocent or passive. All these plants, which I'd always regarded as the objects of my desire, were also, I realized, subjects, acting on me, getting me to do things for them they couldn't do for themselves.

However, coevolution in biology can be competitive, parasitic, and predatory.

On coevolution with technology, see: coevolution 1, , coevolution 3.

2001

P.S. (2016). An interesting phenomenon in the development of Things is the sexy seductive ploys and theatrics of Apple's iPhones that make a little slick Thing an object of status, fashion, and adoration. People seem to physically live with them as with obsessing sexual partners, suffering even a short separation.

Essay 7. On the Smell of Money

[money, ATP, evolution, Gibbs free energy]

Most certainly there is no life on Mars. What about life in the universe?
If this is a legitimate question, then here is another one: Most certainly there is no money on Mars. What about money in the universe?

We are not aware of any intelligent beings in the universe except ourselves. We know, however, until proven otherwise, that the laws of nature are the same whether on Earth or on Mars. The concepts of time, space, matter, energy, temperature, and entropy are equally applicable at least at any point of the near universe our space probes can reach. We have good reasons to believe that life exists somewhere on other planets and it may look different from our own.

On our own planet we are not so much concerned about entropy and even energy as about money. Many can buy energy and matter, maintain comfortable temperature, save time, bring in order what has fallen into disarray, and prolong life. Our literature pays as much attention to money as to love, sex, and power. It seems to be the true focal point of our part of the universe populated by humans.

Money is the simplest thing: it is just a number. It is a very simple number: an integer. We can safely round the useless pennies. Money is the easiest human goal to imagine and to check if it has been achieved: it is just a number. This is why money is so old: it is easy to count it.

We could expect some plain cold simplicity from a number. Not so with money.

What else, what issue, what thing can be more burning, restless like a young dog, tugging the hem of your dress, asking for attention, omnipresent, noisy, playful, deceitful, waking you up in the middle of the night, prone to illness, gratifying, magnetic, mysterious, rewarding, evasive, mercurial, treacherous, dependent, and exhausting? There is one: sex, but money is eternal, universal, and everlasting. Money is a second sex, a reproductive device that not only multiplies itself but rewards you with a whole assortment of heavenly phases of investment, possession, spending, and withdrawal.

Money's childhood and adolescence bring worries typical for these stages, money go astray and end up badly, but what can be compared with the sweet peaceful joy of the

proven, muscular, mature money with a host of fresh rosy-cheeked monetary grandchildren on its patriarchal lap?

I read somewhere that in Ancient Babylon money was regarded a form of life growing on its own, but I cannot find the reference. The Babylonians had banks where they accepted grain and cattle, the multiplying forms of property, and this is, probably, where the idea came from.

A quiet clean bank lobby is a good place to whisper financial confessions to a clerk, but some of us visit such places less and less often in person, as we might shun a temple, and we touch the greenish paper less and less, delegating the talk, touch, and ink to the electrons.

Money is getting more and more spiritual, literally. Or, at least, less material. Money has become a truly ecumenical religion: people with either money or want of it find each other and talk same language. They can talk for hours. One dollar is a line and a hundred is a verse of some sacred book. The temples and shrines are the same everywhere. In its American pantheon-pandemonium, the IRS is the hell, the CPI is its Virgil, FED is Zeus, and Nasdaq tells you what prayer to say tonight. But make no mistake: despite its pagan looks, it is a monotheism. It is the substance of civilization, its blood and breath. It is a form of life. It is life.

Money is not just an object of worship, which it has always been. The old money divided people and made them fight each other. The modern money is a new universal faith carrying the hard to believe promise of uniting the world forever and bringing everlasting peace and true brotherhood.

What money is not is DNA. It carries no information and no hint of what can materialize out of it. It is not a force, either: it meets no resistance. There is no anti-money and no counter-money. It is not matter: the laws of conservation used to apply to it when it was in the form of golden coins, but not anymore.

Money has no shape, no order, no individuality, and, as the cynics say, no smell. In its transformations it passes through a multitude of forms, like energy, but we get the same energy whether we burn a dollar or a hundred dollar bill.

Karl Marx was right when he saw money as an embodiment of work: money is work because work is energy. Nothing can be created without energy. But today the cycle of causality seems closed: not only money is produced by human work, but work itself is produced by money, its power, and lure. Apparently, only because the governments and individuals have money in very much different quantities, other people can make them, too.

What a strange thing: a cocktail of energy, religion, chaos, and work. Money has generated two fundamentally opposite ideas: “inequality of wealth is sacred” and

"inequality of wealth is a curse." The fact is that money, like mercury, tends to fuse into large globules and absorb the small ones. This has been known since Biblical times.

Why not to divide all the money equally? Because the effect of money is not additive. Million dollars divided among million men cannot produce the same effect as million dollars owned by one person: it is the concentration of money and the inequality of its distribution that brings the social wheel into motion. Money is like the Niagara river contained by narrow banks and split into two levels by the waterfall. It produces energy, apparently, out of nothing, but, in fact, out of inequality. One cannot make energy from the greatest of the Great Lakes alone. Energy can be produced from the ocean because of the difference between the low and the high tide.

Everything has its price. The price tags on love, loyalty, betrayal, and life are not always publicly displayed. Human life has its own price tag. The cost of birth, food, clothing, education, transportation, court litigation for damages, and burial are all calculated. To buy and sell human beings is illegal, but to buy eggs and pay fee for adoption and reproductive function is not.

The object that comes to mind first in connection with price is product for sale, merchandise, a Thing. The Thing is not money: it creates money when it falls (or climbs) from the state of *made* to the state of *sold*, although not a slightest change can be noticed in it during this short process. Only after the first night of possession, the look of the bought Thing changes.

Money creates not only goods for human needs, so that humans could exist, interact, and procreate. Money creates Things for their own sake, as well as Things satisfying the needs of Things, Things to protect, manage, and move other Things, Things to make more Things, and Things to ensure interaction and communication between Things and humans.

We can talk about money *ad infinitum* and even get emotional.

Even the professionals talk about money so much and give so many definitions, properties, and functions of money that each statement looks suspiciously shallow. There must be some simple idea behind money, as it is behind any fundamental concept. I am tempted to try to look at money from a big distance and from the outside of economics.

Money as tool of exchanging goods and services appeared millennia ago. To hunt and to grow food is a tedious and insecure business; to buy is a fast alternative, the first form of immediate gratification after sex.

If humans biologically are as old as their tools, human society is as old as its money. Any evolution starts from a point and then branches out into a tree.

Looking for the genesis of money, I would assume that the first money could be the tools and hand-made objects themselves: they were their own money. We have an oblique

confirmation that money could have actually diverged from tools. The ancient Chinese used bronze tool money in the form of little spades and knives around 300 B.C. Some historians of money regard cattle as its oldest form.

Since I am not a specialist in money, whatever I write is just fantasies. We find a cluster of fascinating Web sites about money with the real stuff, including its early history.

The exchange of good and services played a role similar to sexual reproduction involving the exchange of genetic materials. The exchange presumes a physical contact. Various things created at different places could evolve, improve, and combine much faster when put side by side and compared. The coins could be carried to the marketplace much faster and easier than cattle.

Humans of all kinds make a single species because they could mate and trade with each other. They could do both even without common language. There is an animal simplicity in trade.

If the material Things were the proteins of civilization, money played the role of the carrier of genetic information. The carrier, for example, radio signal, is not information. It is never written on amino acids and nucleotides what can be built from them, the fly or the elephant. It is never written on coins and bills what can be bought for them. For that matter, it is not written on a kilowatt of electricity whether you can use it for cooking or for cooling.

Wherever there is life, at least on Earth, there are amino acids and nucleic acids. Wherever there are conductors crossing a magnetic field, there is electricity. Wherever there is—what?—in the universe, there is money. The "what" seems to be society. The question is what all three have in common. What are the cosmic analogies of money? Is it energy? temperature? entropy? mass? What is society from the point of view of physics? I am on the hunt for metaphors and parallels. I cannot buy them.

In biology, most biochemical functions are performed by enzymes, usually pretty similar for different species. To reproduce, the cell needs energy, matter, and code. The forth component is the enzymes that the cell carries over for the start and then synthesizes on the spot.

The Thing needs same four components to reproduce. Money can buy all that: physical energy of food and electricity, brick and mortar, blueprint, and skilled labor. And—sorry for being cynical—even the mate.

If money can do all that, then we come to the most universal function of money: reproduction. Money takes part in the replication of the social organism. Of course, not as a code, but as some other component.

Humans mate and so procreate biologically. Humans trade and invest and so reproduce what remains in the civilization if we subtract the humans. If all humans in an instant go

to heaven, what remains is Things, the material civilization. All the books would turn into useless Things because knowledge is dead without humans. If there are intelligent and autonomous Things, they would still rely on their codes and files. Would they need money?

This imaginary situation is a good opportunity to explore the extra-human function of money.

We know what humans are. What is a machine? From what mental distance the difference between both is blurred?

The meaning of the term machine has evolved like the machines themselves.

The oldest view of the machine is mechanical. It is a combination or one of the following simple machines: the lever, the pulley, the inclined plane, and the wheel and axle. Of course, we cannot expect from it either a brain scan or solving differential equations.

Machine is defined in Webster II as "a system, usually, of rigid bodies, constructed and connected to change, transmit, and direct applied forces in a predetermined way to accomplish a particular objective, as performance of useful work. "

This definition formally fits even the computer, although neither the input forces nor the output work are essential for its objective. It also fits an enslaved human being used by another human being, although it is not constructed by any other human being.

I believe that there is an aspect of machine performance, omitted in the definition, that is essential for a much larger class of objects: the machine is capable of repeating its functions several times. In other words, the **machine replicates performance in time, not in space**. This is what is expected from CAT scanner, computer, telescope, airplane, and what not.

There are disposable one-time machines, but only as an exception or when disposability is an objective, for example, the detonator for an explosive or a rocket booster. The space shuttle is a typical machine.

I would define a very abstract machine as a system that repeatedly goes through a similar sequence of states. Even the solar system fits this definition and, who knows, maybe even the universe. The machine does not need to be of any particular material or physical nature.

The very abstract machine is a class of abstract machines that can be controlled: mostly started and stopped, but possibly also accelerated, slowed down, and switched to a different function.

Considering the oldest man-made machines, a pot, a knife, an ax, a needle are not machines because they do not change. They are attended by humans, the typical

machines. The first machine that I can think of is the wheel. It repeatedly goes through a cycle of states and it can be started and stopped. Some ancient machines for taking water from the stream, like the Egyptian *shadoof,* used the principle of lever and did not have a wheel. In my youth I saw such devices called cranes in the Ukrainian countryside.

Computer is definitely a machine because it can be used repeatedly and for a wide range of purposes. It is a very sophisticated machine, like humans, because, while the wheel can only roll, the result of the computer's activity is not predetermined. The particular inputs and outputs could be one-time, like a birthday greeting to a friend, but the cycles of performance are similar. The states of the system do not need to be repeated in the exact sequence. The mathematical phenomenon of strange attractor illustrates a mathematical machine that is not material at all.

There are also complicated molecular machines called biochemical cycles. They do not have any rigid bodies. The Krebs cycle, for example, repeatedly spins through a circular sequence of chemical states and provides living cells with energy through *aerobic respiration* or breathing, to put it simply. If you step far back from the diagram, all you see is a wheel.

In fact, the Krebs cycle is more like a circular assembly line supplied with parts at every station and with ready product coming off at one of them, something like the baggage conveyer belt at the airports. The difference is that the Krebs cycle is, actually, a disassembly line: it takes a molecule of already partially disassembled glucose coming from food and at every stage takes a piece of it and processes. The output is energy packed in a form of tiny molecular batteries called NADH and FADH2. The batteries are transported to a place where they are discharged in the presence of oxygen and the energy is repackaged into ATP , another form of molecular battery, the universal currency of energy accepted everywhere in the body from brain to muscles to kidneys. The discharged batteries of all kinds (NADH, FADN2, and ATP) go back to their charging stations.

The discharged ATP is called ADP. A single molecule of glucose is capable of charging 36 ADP batteries while it quietly burns to carbon dioxide and water

A parallel with battery on the Web sounds like the poetry of Lucretius:

> How does it work, this marvelous battery
> to which we owe our lives?
> The battery is a molecule -
> a molecule called adenosine triphosphate -
> abbreviated as ATP.

The wonderful molecular machine, of which the Krebs cycle is only a part, can be compared also with a watermill producing work from the energy of the falling water. In the absence of water, alias, food, the machine stops. In the organism, the machine cannot be stopped or started from the inside, but it can be regulated.

The glucose that we need to keep the body and mind going comes from edible plants. The plants have their own assembly line that really, literally, visibly assembles. The molecule of glucose is gradually built using carbon dioxide, water, and the energy of light. The plants "exhale" the oxygen that we, the animals, breathe.

The idea of environmentalism, in short, is that all life on Earth is a single system. In a sense, it is a single organism that those of us who are humans, conspired with Things, are starting to wreck.

I cannot find any flaw in this idea, but it implies that this single organism **has no competition, no spare copy**, but whatever can happen to it is perfectly natural and neither good nor bad. If we are so dumb, the hell with us, and let other forms of life push us out. The function of any organism is to adapt, and life will adapt to anything. As an organ of the organism, we might adapt, too, although, to put it politely, in an evolved form, like the remnants of our former tail in our spine.

But back to our beloved money.

It seems that the evolutionary roots of money could be found deep in the very basement of life. ATP is the money of animal organisms. It has to be paid for running a treadmill, solving a mathematical problem, watching TV (it requires energy, too), building up the skeleton, healing a wound, digesting food (here is a form of investment!), and removing the refuse from the organism.

Moreover, ATP provides energy for the light emitting by the firefly and electricity generated by electric fish. The parallel between ATP and money seems complete. It buys everything, but all ATP bills are alike.

All this is possible because of the wide array of abstract machines and the availability of energy to bring them into action. It is the repeatable function that is essential for an abstract machine, and the cycle is only one form of it. There are non-cyclical biochemical pathways, too.

At a higher level, we are, probably (but, hopefully, not exclusively) machines for spreading our genes, or "gene survival machines." This idea belongs to Richard Dawkins, who believes that our body is a disposable, throw-away machine to preserve and pass our genes.

We are born, eat, grow, study, eat, work, mature, eat, work, seek a mate, eat, work, procreate, eat, work, suffer, and die. It looks like we are disposable machines as individuals, but on a shorter time scale we are capable of the greatest quantity and variety of repeatable actions any machine can do, and no wonder we get finally worn out. For that matter, no molecular, biological, mechanical machine, or even computer are any better. We can boast a great longevity in the animal world. Anyway, the social machine that reproduces the species still works fine. But due to some basic laws of nature, no machine is forever, all of them are disposable in the long run.

If money is energy, what kind of energy is that? This question can be answered simply: free energy. To explain what free energy is would take a separate essay: the concepts of heat, work, free energy, entropy, and temperature are the primary and elementary building blocks of our understanding of everything in the world. As all really fundamental blocks, they cannot be explained by reduction to simpler blocks. The best way to understanding is to play with them, like a child learning about the world through vision, hearing, touch, and Lego.

The term **free energy** is misleading in our times of the free gift madness. It is not the free of charge energy. There are a lot of sites on the Web about "free" energy from natural sources, like wind, ocean currents, etc., but they are not of immediate interest for us. What I have in mind is the so called **Gibbs free energy,** one of the basic concepts of thermodynamics. If somebody wants to learn more about it, search "free energy" + thermodynamics.

In short, "free energy," or **Gibbs free energy**, is the part of total energy that brings order into chaos by performing work. It is called free because it is not tied to heat. It is really like free money that could be used for purchase. Heat, on the contrary, is chaos and it turns everything into chaos. Hot money can be compared with an account with irregular deposits and unpredictable bills. You never know whether your check will bounce. If this comparison appeals more, it is the stolen money and you, nervously looking for a police car coming to your driveway.

Free energy is like an account of completely disposable money, in the best case filled up with the salary from a life tenure job. This is something that is never guaranteed to any particular species, all the more, individual.

Since order and chaos are concepts applicable to all systems, social, mental, animate, and inanimate, thermodynamics is in a way related to anything in the world and not just to physical systems.

The symbol of free energy is **G**, to honor the genius of Josiah Willard Gibbs whom chemists, mathematicians, and physicists recognize as one of their kin.
From the point of view of thermodynamics, "free" energy is the newest snake oil. The Hoover Dam cost $165 million (about $2 billion in the 2000 dollars, remarkably low today, especially as compared with the over the $10 billion Boston Big Dig), and it produces "free" energy. Nevertheless, this overlapping of financial and scientific terminology around energy is meaningful: if money smells, it is the smell of energy. If energy smells, it is the smell of money.

Our civilization works like an imperfect and capricious clockwork made of billions of parts. Nevertheless, the absolute majority of us get up in the morning and go to work, although we can easily imagine millions of other alternatives: sleeping until noon and go fishing after that. Somehow, this is possible only during a small part of the year. The energy of fuel, wind, and water goes to keep this system in order, and no wonder the

gigantic construct sways and trembles in the torrent of energy that keeps it standing in a precarious steady state, like the Great Pyramid of Khufu set on its apex.

Similarly, if our body and mind work with an acceptable accuracy, it is because our cells and organs are supplied with freshly charged ATP batteries. Stop the supply, and in 45 days or much earlier you are dead. Without water it would take about five days because the batteries are transported by water, the main component of our body.

Money, therefore (it is not the logical therefore), is the ATP of social organism, it is the free energy equivalent of making a Thing for sale, never accurate, but socially acceptable.

Gibbs' free energy is a tricky thing, however. Its ability to perform work and tame chaos depends on the temperature of the system. The higher the temperature, the more free energy is needed to do the same job. This is why inflation jumps in times of turmoil. This is why Alan Greenspan throws a bucket of cold water at an overheated economy. But temperature is a separate subject.

My point is that the modern and, especially, future function of money is to represent the free energy necessary to maintain a species of a dynamic competitive system. It can be a cell, an individual, a custom, an idea, a Thing, a species, or a genus of any of the above.

I see money in the process of evolution from its primary form of ATP. Only economists and historians who find this idea appealing (it might have been already expressed; it is hard to be original on the Web) could, theoretically, restore all the intermediate steps from the beginning to the current electronic form. I have to stop here and leave the logical gap to possible enthusiasts.

The new direction of econophysics, ridiculed by most classical economists, tries to bridge money with both physics and biology. I have some uncommon reservations about computer models, and, probably, talk about them elsewhere. Anyway, the thermodynamic connotations of money are widely accepted. "In human society money serves to measure and mediate local markets for decreasing entropy, whether it measures the refinement of an ounce of gold, the energy available in a ton of coal, the price of a share in a multinational organization, or the value of information accumulated in a book." (George B. Dyson, *Darwin Among the Machines*, Addison-Wesley Publishing Company, 1997: Reding, MA, Menlo Parc, CA, etc., p. 170; there is much more about money and information). Nebulous and wonderful! But I cannot offer anything more coherent except a note. Two states of a system can have the same entropy and energy. Nevertheless, to transform the system from one state to another might require free energy because the intermediate state has a higher energy than the initial and the final one. Example: you are moving to a new house on the same street just couple blocks up. You have to do quite a work or pay for it.

The coherence, like moving, should be left to professionals.

What is easier for me is to fantasize about the future of money. I see it based on the energy standard because I believe that the energy crisis is highly probable. Gold was popular as money because one could not grow gold in the garden. Paper money is in use because to make a perfect counterfeit money is more difficult than to strike a gold mine. Electronic money is in use because it is still difficult to crack the passwords (but, I suppose, less difficult than to make a perfect hundred dollar bill). When energy is scarce and everything depends on it, it becomes the currency. To make free energy is more difficult than to grow money in the garden: it is impossible.

We can look at the future coins even today. Just go to the battery stand in a pharmacy. You can see there the bills of various denomination, like B, AA, AAA, etc., as well as small, flat and round coins, pretty much like the coins in your pockets, that can make your watch running for a year or two. With coins like that, one can buy his or her hearing for a month and others can even buy a stretch of life by feeding the coins into their heart pacers.

I suspect, however, that it is impossible to fully understand the nature of the evolution of money if we do not take to account a particular aspect of evolution (see **Essay 6**).

The energy of food and the fluidity of water are necessary for the survival of all life forms. But what is life? The notion of life has been expanding since the times of Aristotle. Biological life is only one category of the formerly exclusive club of life.

Does anybody really think that $10,000 watch is necessary for human survival? Of course, not. A $5 watch would do. The $9,995 difference goes to the **survival machine of the watch**.

Biologists see evolution limited to life forms. Sociologists see it as evolution of social forms. The historians of technology (technobiologists?) would see it as evolution of the Things, and the historians of culture look at the evolution of ideas and art. In fact, the substrate of evolution, at least today, comprises all of the above. Anything that lives and evolves, however, can exist only on the constant supply of **G**, Gibbs' free energy. The larger life, meta-life, includes the forest, the whale, the human, the watch, the car, the city, the government, and the Internet.

From the evolutionary point of view, the really ***free*** **free energy** comes from the amazing very abstract machine of the solar system that, working as a flywheel, supplies light, changes the tide, the seasons, raises the wind and drives the currents. That machine, full of energy and complexity, once gave birth to life. Its own evolution is the subject for astrophysicists. The enthusiasts of free energy are, therefore, right. The problem is that the utilization of the **free** free energy is not free.

This essay is not about dollars, however, it is about their smell.

2001

Essay 8. On Buridan's Ass

[cognitive dissonance, Niels Bohr, transition state, history, equality, Buridan's ass]

" If you have a correct statement, then the opposite of a correct statement is of course an incorrect statement, a wrong statement. But when you have a deep truth, then the opposite of a deep truth may again be a deep truth."

Niels Bohr made this often quoted remark in the context of the emerging quantum physics and the complementarity principle he had suggested. The examples that he used to illustrate his idea were far from quantum physics, however: 2 x 2 = 4 as a correct statement and "God exists" as a deep truth. Because of its very general character, Bohr's idea was even posted as "meeting ground of science, philosophy and religion." I wonder if anybody noted that by exalting the quotation as a deep truth we make it self-denying. On such a shaky ground I can hardly expect producing anything but a shallow truism. Yet the idea that fascinated me in my youth seems such a good seed for an essay!

To face two contradicting true statements could be a very discomforting and dizzying experience. What is good for the electron is not quite good for the mind. If both ideas are of equal stature, the mind can be suspended between them like the Buridan's ass that died of hunger, incapable of making choice between two equal bundles of hay. If an idea is either true or not, then all true ideas are equally true. But there could be some way to measure the value of truth to trade one truth against another.

The Buridan's condition can, in principle, affect a collective, corporate, or even a national mind.

I witnessed the first case of a split national mind in the Soviet Union when it had not yet been "former." The Russian psyche, for example, had to reconcile two particular ideas:

1. People have personal property and the rest belongs to the people.
2. People have personal property and the rest belongs to the state.

The only way to embrace both ideas was to identify the people and the state, which would be a big mistake in any society.

The split went deeper:

1. We have freedom of speech.
2. Everybody who criticizes the political system is a criminal.

1. We have free democratic elections.
2. There could be only one candidate in any election.

And so on.

When people wonder why Russia, more than ten years after Communism still does not look like a normal country, its prolonged recovery from a grave mental condition could be an explanation. As an appropriate metaphor for it, national schizophrenia sounds exact.

Although schizophrenia means *split mind,* it is not quite what its Greek name might suggest. Its pathology comes from the split between the mind and the reality. Rather, schizophrenia is broken mind.

There is a psychiatric condition called *split personality* (multiple personalities), but the patient can have only one personality at a time.

Probably, the best term could be **cognitive dissonance**, if only it did not sound so terribly technical. Interestingly, the concept is almost as old as computer technology. Not being a household name, it is something we are very much familiar with because human psychology is about what we can see with our eyes closed.

Cognitive dissonance looks very much as the true split mind. It occurs when two or more logically incompatible ideas have to share the mind like two bears in one den. Struggling for peace, the mind usually pretends that one of the bears does not exist or is not a bear but a groundhog.

In my opinion, an exemplary, although casually recorded, case is that of the first woman on earth. Yet unnamed at the time, she quotes God to the serpent : "God hath said, Ye shall not eat of it [fruit of the tree of knowledge], neither shall you touch it, lest ye die" (Gen., 3, 3). The serpent reassures Eve: "Ye shall not surely die," and throws in more arguments. Eve acts upon the totality of all contradicting information, observations, and natural instincts, thus resolving the dissonance, and I see no evidence that her progeny ever regretted it.

In extreme cases, the mind is in agony. In others, the result looks more like flipping the sign with OPEN and CLOSED on a shop door. It is closed for the night but will be open in the morning.

An example of a trivial cognitive dissonance is the struggle of two ideas: it is good to drink at a party and it is bad to drive under the influence of alcohol. This conflict of ideas can be solved relatively easy and the sign permanently shows CLOSED to the bad choice. The technical solution such as a designated driver is also available.

Hamlet's predicament is a classical example of the grand cognitive dissonance, alias, internal struggle.

To be, or not to be: that is the question:
Whether 'tis nobler in the mind to suffer
The slings and arrows of outrageous fortune,
Or to take arms against a sea of troubles,
And by opposing end them?

An easy solution is not to do anything, trust the power of time, and let the things take their course. That was, actually, the attitude of the majority of the Soviet people. Hamlet takes arms and dies.

In Sophocles' *Antigone*, written around 440 B.C., the eternal conflict between law and personal duty is represented by king Creon and Antigone who do not have any doubts about their respective stands. It imposes a dilemma on the population of Thebes, as well as on the mind of king's son Haemon who is torn between the filial obedience and love to Antigone. The tragedy ends as a tragedy, not as a Hollywood movie, and all the good guys die. The conflict was only slightly rearranged by Shakespeare in *Romeo and Juliet*. For the people of Thebes, however, like for the people of Verona and theater audience of all times, the conflict is not personal, it is purely abstract. The subconscious physiology plays little role here and all the cards are on the mental table.

Literature is powered by conflict. If not for cognitive dissonance, with its overtones of drama, suspense, challenge, and risk, we would not have any creative writing, no epics, no romance, and no detective stories, either.

Unlike Hamlet, Antigone does not have any doubts. The hero who reflects and vacillates comes later in history.

One can ponder “to be or not to be” for years, but the smoker's dilemma requires an immediate decision. In the struggle between “it is good to smoke” and “it is bad to smoke,” the choice between wisdom and pleasure is literally a matter of to be or not to be.

The smoker's dilemma is the most often cited example of cognitive dissonance. Because of the substance addiction, however, the somber drama displays in deep physiological cellars of the brain where mind has little power. It is really an impasse, the mind is cornered, and there is no cop-out. There is no such thing as a designated smoker. A nicotine patch? The love triangle is of the same nature, but love mercifully turns off the reason and lets the emotions act.



Pablo Picasso, *Femme nue jouant avec un chat 3*. 1964

The mind tries to reduce the discomfort in one way or another, sometimes, by ignoring the information that aggravates dissonance or adding weight to the information that alleviates it.

With the rising din of the twentieth century, dissonance became a common device of modern art, especially, in music, painting, and theater. The

Picasso's women seen from both front and back and projected on the plane like the map of the world (see, for example, *Femme nue jouant avec un chat 3*), exemplified the new dissonant vision, while others (*Nu assis aux bras levés,* 1940) seemed like allegories of broken mind, which was also the *forte* of the artist Francis Bacon. Picasso, known as a cruel woman-hater, took it out almost exclusively on women, while Bacon gallantly diverted it on himself.



Pablo Picasso, *Nu assis aux bras levés,* 1940

The art of René Magritte, whom I like very much, was based entirely on the visual dissonance, while Maurice Escher tried to catch the fleeting moment of transition from one opposite to the other.

The sharp logical dissonance in statements referring to themselves, like "This sentence is not true" generated a massive amount of mathematical research in the twentieth century. If it is true, then it is not true, and if it is false, then it is true. Can we resolve the dissonance? The famous **Gödel Theorem** was born out of the problem. Its substance and scope are highly technical and complicated, but the proof carries grave philosophical implications. For instance, one can expect examples of logical statements ('Is secession constitutional?') to arise that are neither provable, nor disprovable, within a complete logical framework. One should not be surprised when the collective mind of the Supreme Court is split.

The scientific ideas that have survived for half a century, keep developing, and even make inroads into politics deserve deference.

I believe that cognitive dissonance is only one case of a very general situation when a system seems to be in two incompatible states at the same time.

The general situation spans, in part:

from the pendulum of a grandpa's clock

to the love triangle, which is not a static geometrical figure but a vacillation between two extreme positions,

from chemical equilibrium where a mixture of molecules A and B turning into each other comes to a constant ratio A/B (it seems like nothing is going on, but the equilibrium is dynamic: at any moment some of A turn into B and an equal number of B turn into A),

to a tight election campaign where the pool of undecided voters, like a swarm of gnats, creates a cloud of uncertainty,

from the old sophism about chicken and egg

to the problem of what came first in molecular evolution, DNA or proteins,

from quantum properties of a photon, torn by probability between two positions,

to the mind of a gambler choosing between red or black of the roulette,

from mathematical paradoxes

to the psychology and psychopathology of stock market.

from the dilemma of a religious believer who has to choose between the Bible and Darwin

to the dilemma of the prison doctor who has to decide whether to treat a mentally ill prisoner on death row so that he could be executed.

In the range so wide, the word dissonance is hardly applicable. Nature does not know dissonance: the mind does.

Mind is complex, but there is little more we can say about mind. In the state of cognitive dissonance, mind is like a molecule that tries to decide whether it is A or B. While it is deciding, it is both.

Where a psychologist declares **cognitive dissonance,** chemist, like myself, would use the term **transition state** for the ephemeral evasive structure existing for a short time in a chemical reaction and capable of either returning to the initial stable state ***A*** or advancing to the final stable state ***B***. Nothing in the transition state alone indicates which way it will go. It is the triad of initial, transition, and final states that determines the probabilities of the outcome.

A historian would use the terms **crisis** or **revolutionary situation**, describing the time of upheaval and confusion, but the actual participants had no idea, while the historian knows *post factum* how the events turned out. The presidential election of 2000, with all its bewilderment, presented a colorful example of a short-living, only hours long, transition state on a smaller, sub-historical scale. A historical transition can take centuries, as happened with the Industrial Revolution, and it can be observed in all details if the records are available.

In short, it is the moment of transition, emergence, uncertainty, ambiguity, and gray area between ***yes*** and ***no*** that decides the fate of individuals and nations. It is something that 20%, 50% or 80% ***yes*** and the rest is ***no***. Looking back, everybody can see at least one moment of irreversibility that changed our lives forever, "point of no return unremarked at the time in most lives," as Graham Greene, a great analyst of the dissonance, wrote in

the beginning of *The Comedians*.

What happens between an offer of a recruiter to a potential spy and his acceptance (or rejection)? What happens between the call for help and rushing between an armed criminal and his victim?

In general, what happens between tossing a coin and its hitting the ground? Even the theory of probabilities has no answer. Metaphorically speaking, the mind of the falling coin is split fifty-fifty.

Suppose, a new reality becomes known in the form of new event (like a high school shooting), scientific idea (human cloning), discovery (protein as infectious agent), social shift (toward temporary and disloyal employment), political development (scandal), act of war (God forbid!), or act of God hurling an asteroid toward the sinful planet.

Often only a minority cares. If an individual takes the news close to the heart, his mind must take a stand. Sometimes, the majority is united on the subject. Sometimes, society splits into parties sticking to two different opinions, while the undecided are in significant minority. Sometimes, both sides are just minorities.

Initially, while the news is fresh, everybody knows only his or her own opinion. The next transitional stage is the information about the opinions of other individuals.

As soon as the opposite sides are aware of their mutual positions, their numerical strength, and the implications of the split, we can speak about a dissonance in the collective mind. The opposites create each other, leaders step in the limelight, money is raised, lobbying is launched, lawyers hired, and the two mental bears start a wrestling round with a bear hug.

People mostly have no problem with choosing their positions. It might happen, however, that the individual choice is difficult.

With my mind perversely attracted to inconsistencies, I noticed some familiar symptoms in America.

The issue of abortion presented the biggest problem to me. When, soon after my arrival to America, I saw for the first time small groups of protesters with gruesome posters, I could not believe my eyes. I thought the legal and affordable abortion during the first three months was one of a few civilized features of Russia.

The concept of freedom, as I understand it (certainly, whatever you say about freedom will be a deep truth), allows everybody to make his or her own decision, especially, of a very private nature. If there is freedom of religion, why is there no freedom of reproductive choice? Yet men, who know neither pregnancy nor abortion nor the true burden of childcare, dictate women who are not even their wives or mistresses but complete strangers what to do or not to do during pregnancy. All the men can reasonably do is to take a vow not to perform abortion on themselves and each other.

The dissonance screeches within two pairs of ideas:

1. Person is a born human.
2. An unborn human is a person, too.

1. Religious views cannot be imposed by the government.
2. Religious views on conception and pregnancy must be the law for everybody.

Another case of split mind concerns violence.

1. The culture of entertainment demonstrates and glorifies violence. Violence sells.
2. The cultural, religious, and social tradition forbids violence. Violence is destructive. Or, to put it differently:

1. We advertise products and behavior by showing happy and successful people who use them and unhappy clumsy people who don't. The law forbids violence. We do not advertise violence.

2. We advertise violence by showing around the clock good, attractive, and successful men and women slaughtering other people in an elegant and efficient manner.

Next:

1. Tobacco is a legal product. Its health hazards have been in public domain for a long time.
2. Manufacturers of tobacco are sued for the harm done to the smokers.

While tobacco manufacturers can be sued for making completely legal products, the makers of violent entertainment cannot.

Another ear-scratching dissonance comes from the discussion on guns.

1. The criminal (or the human nature) kills.
2. The gun kills.

Some cases relate to education:

1. All people are different
2. All people can equally succeed in learning

Others complicate the problem of freedom of speech:

1. Everybody is free to express her or his personal opinion.
2. Nobody should offend others with his or her opinion.

An entire class of utopian expectations or self-contradicting measures grows from the counterpoint:

1. Men and women are different.
2. Men and women are equal. (Therefore, "his or her", Xena the Warrior Princess, etc.)

1. Save the caribou.
2. Save the low gasoline price.

1. Limit the tobacco growing to save the smokers from further damage.
2. Tax the smokers to pay the tobacco growers to save the smokers.

The pure case of national schizophrenia was recorded by Jonathan Swift as the conflict between those who break the egg at the large end and those who break it at the small end:

1. It is convenient, customary, and natural to break eggs at the large end.
2. The law requires the opposite way of breaking eggs.

Being a strong believer in gun control and the power of numbers, I wish I could make a case against guns, using math as an evidence.

Probability has always had a mystical aura in my eyes. I am crossing the street and the goddess of probability hovers over me making a quick decision whether the oncoming car will hit me or stop at the red light. I live my life, and after a certain age, probability to die next day is growing faster and faster, like an evening shadow. And in fact, the car does not hit me because the probability is low and I die because the probability is high. The amazing thing is that whether the car hits me or I live to 100 years, either way it will be justified by probability.

Probability makes us nervous or assured, self-destructive or cautious, hopeless or energized. Hope is probability. Fear is probability. An umbrella is probability. It is a powerful factor in our life, moving millions of dollars and driven by megawatts of energy. This is awesome, taking to account that the value of probability can never be more than one and less than zero. The immaterial probability has a very intimate relation with energy, but this my private obsession deserves a separate essay.

Probability is a more agile sister of cognitive resonance: a rapid swinging between ***yes*** and ***no***, so rapid that we sometimes do not see the extreme positions. Probability is the fraction of ***yes*** in the superposition of ***yes*** and ***no***.

Next follows a primitive example of dealing with probability, which may well be skipped.

Here I have in mind only one property of probability, which can also be discovered by using common sense. For the experiment we need two identically shaped objects of one kind and two of another kind. It is remarkable that paper dollars, all of the same size, is the only category of such objects that we always—almost—have on hand.

If we have one $1 and one $20 bills in the left pocket, the probability to pull $1 is 1/2. If we have the same bills in the right pocket, the probability to pull $1 is also 1/2. The probability to draw $1 bills from both left and right pockets is 1/2 x 1/2 = 1/4. This can be checked by repeating the drawing many times. In approximately a quarter of all drawings we will pull $1 from both pockets, provided we put them back in a random fashion, which is a rather awkward requirement.

To arrive at this conclusion theoretically, we simply need to list all possible independent events:

Event	Left	Right
1.	$1	$1
2.	$1	$20
3.	$20	$1
4.	$20	$20

Evidently, the $1 & $1 combination is only one of four outcomes.

If there is event A with probability P(A) and independent event B with probability P(B), the probability of the events A and B happening simultaneously is the product P(A&B)=P(A)*P(B).

This illustration tells us something about probability. We can get the result in many cases without any complex mathematics, using our common sense and calculating the total number of all possible events. We need more mathematics only for more intricate questions.

The laws of probability are much harder to dispute than Darwinism. They can be tested with the same result on various models 24 hours a day. In Bohr's terms, it is a trivial truth.

Let us take the case of gun violence. If the probability that today a man firmly decides to kill another man in Murdertown, MU, is P_M (M for murder) and the probability that a man possesses a gun in the same town is P_G (G for gun), than the probability of a murder with a gun is not more than the product of two probabilities. $P_{M\&G}$ (Murder & Gun) = P_M *P_G . Actually, it is lower, because it should be multiplied by the probability that the victim is within reach.

What this trivial truth tells us is that if P_G is very low, $P_{M\&G}$ (Murder & Gun) will be still lower. If $P_G = 0$, $P_{M\&G}$ will be 0 even if $P_M = 1$. This is because probability is a fraction and if we multiply two fractions, the product will be less than any of them: 0.5 * 0.1=0.05. This reasoning might be not so accurate and even naive, but it illustrates the principle:

the probability of two simultaneous independent events equals the product of their separate probabilities.

The limits on gun possession will have a powerful reducing effect on the probability of gun violence. If the violence is reduced, then there is less reason to have arms.

I hope this is a rational argument. One can find scores of rational pro-gun arguments, too. It is hard to disagree that in a violent country one has to protect himself. On the other hand, in a civilized country it is the government's job to protect the citizens in a professional manner. For the sake of variety, it is nice to see an anti-intellectual and anti-government society still based on Western values, but this combination is an ultimate dissonance, a *Nu assis aux bras levés.*

In my search for the truth, whether deep or shallow, I decided to look at the numbers on the Web. I was surprised that the statistics did not jump on me from the screen. It was difficult and sometimes impossible to find reliable data.

I found the number of gunfire victims surprisingly low:
There were a total of 30,708 people killed by guns in the U.S. in 1998. Of these:

*** 17,424 were gun suicides.**
*** 12,102 were gun homicides.**
*** 886 were unintentional or "accidental" shootings.**
*** 316 were shooting deaths of undetermined intent**

At the same time, the number of traffic fatalities told me that:

About 41,345 people lost their lives in traffic crashes during 1999, in 1998 there were 41,471 fatalities.

Since one does not need to be the driver in order to get hurt in a crash, the entire population is at risk. The risk to be killed by car is higher than the risk to die of bullet. There are dangerous neighborhoods, and there are dangerous intersections.

It is obvious that the use of cars must be limited in order to save lives. The murderer does his best to kill, while the driver does his or her best not to kill and not to die in a crash, and yet more people die in crashes than of bullet.

On the second thought, if we protect spotted owl and sea turtles, why not to protect

human fetuses?

Thinking about all that, loosing ground under my feet, and feeling dizzy like from ***This sentence is false***, I felt as disoriented as a compass on the North Pole, where every direction points to the South. All I could do was to formulate some personal opinions.

Niels Bohr was absolutely right: a deep truth is as true as its opposite. This can be possible, however, because both are equally irrelevant for basic human needs. The general course of life is driven by shallow but practical, singular, and opportunistic truth of the moment.

Whatever the law, there is always a significant probability that the killer will find a gun, the unwanted pregnancy will be interrupted, men and women will be equal at some opportunities and unequal at others, most people will carefully consider whether to speak their minds under the circumstances, some people will learn and succeed more than others, ads and entertainment will appeal to basic and base human instincts, religious ethics will not stand against the pursuit of health and beauty, and the eggs will be broken at the most convenient end.

Deep or high truth is the truth shared by such a large number of people that the opposite is shared by a comparably large number, too. Quite automatically, as soon as one truth spreads and acquires the status of the grand truth, its opposite attains the same status by default, ceases to be a heresy, and its proponents begin to consolidate the ranks around leaders, worship martyrs, raise money, and lobby the government. The necessary condition is, however, that the truth is really irrelevant to basic human needs, like the question whether to cross oneself with two or three fingers, and personal experience does not provide any clue. On the contrary, it is vitally important to know that 2 x 2 = 4 in order to keep the personal finances sound.

The absolute majority of people have always believed that personal security, pleasure, comfort, health, beauty, and wealth are good. The opposite view remains heresy, sectarianism, or sainthood. On the contrary, the deep truth is abstract and open to doubt and debate.

People hold on to a pragmatic individual truth regardless of what other people think. This is not quite so with a collective truth, otherwise known as deep truth, which exists only because there is an opposite collective truth.

Paradoxically, the truth is shallow if an overwhelming majority of people shares it. A fifty-fifty split national mind is the perfect certification of the depth (more government? less government?).

Therefore, the closer the fraction of believers to 50% , the deeper the truth. If the ratio is small or large, it means that one deep truth is less deep than its opposite.

On the other hand, a deep truth is only a half-truth. Does idealism make sense? Why do

we want to save the whales and limit the use of sonar necessary for the safety of people in submarines?

Ban the submarines! Ban capitalism! Down with the government!

Youth is a transition state. National schizophrenia is a transition state. Insoluble contradictions, dissonance, undecidable measures—it is all, like in chemistry, is an ephemeral, on historical scale, transition state of social change. Even the mind-boggling contradictions of the Soviet Communism were an evidence of an overdue, frozen transition. Having seen both, I truly believe that democracy and tyranny are not the logical opposites but the opposite ends of the single scale, like cold and heat are simply temperatures below and above the body temperature.

Nothing can drive large masses of people in one direction as effectively as abstract, irrational, nebulous, and idealistic goals. They turn human molecules into solid bodies that can perform mechanical functions of destruction and construction. Nothing can as effectively resist the flocking instincts as tightening the screw on basic, almost animal, human needs. Rich society protects the whales, poor society tries to survive and eats rats and dogs.

Each time we give to an abstract idea (sanctity, global domination, democracy, national pride, privacy, even freedom) a priority over basic human needs (security is one of them), we move toward the totalitarian end of the scale.

The secret of a totalitarian state, whether Fascist or Communist or any other past or future form, is that it starts with idealism, i.e., with a deep truth. When it becomes evident that idealism works against basic human needs, the population must choose between a dire deprivation of human needs and whatever else the government drives into their minds, so that any flocking and resistance is out of question, and "whatever else" is accepted to ease the dissonance. Good-bye whales, caribou, and spotted owl!

Well, I have arrived at the shallow truism that I anticipated in the beginning. All that has been well known, analyzed, and recorded as one of the major lessons of the twentieth century and is quite trivial. For somebody who, like myself, has lived through most of the twentieth century, however, it never fails to stir the pool of late and futile emotions.

But what about the Buridan's ass? The modern solution of the problem seems to be that any complex dynamic system—and animal mind is more than enough dynamic and complex—experiences fluctuations. No balance is balanced and no equilibrium is equilibrated forever. Pretty soon there will be a moment when one bundle of hay will look bigger than the other. Besides, a gust of wind could move one closer to the mouth than the other. Thus, in the 1930's there was a period of hesitation of idealistic Western intellectuals between the capitalist and socialist bundles of hay, but the winds of history, starting with the Communist repressions and Hitler-Stalin pact, showed that the equality was an optical illusion. It is hard to blame the idealists in times when the capitalist bundle of hay was severely shaken out by the Great Depression.

This is how history is made and our lives are lived. Something always happens in our lives and in history because any hot enough complex system is full of chaos and driven by probability and not certainty, and so we fall into the trance of our dissonant transition state and come out of it to a landscape that has changed, and we ourselves look different in the mirror, notice gray hair, and this is how life walks, one foot firmly on the ground and the other in the air, one step at a time, mostly standing still, and rarely jumping with both feet above the ground, causing an eerie, electrifying sensation of losing one's mind.

If we still have $1 and $20 bills, we can conduct another experiment: show them to a man in the street and suggest to take one. If we do it many times, the statistics is easy to predict. The probability that the man will take $20 will be very high, as compared with taking $1 or not taking any. Therefore, the fact that the bills are of equal size cannot deceive basic human instincts. Well, we still have to run this experiment before we state anything.

If you asked me what next abstract idea is likely to be given priority over basic human needs in America, with potentially destructive results, I would reluctantly say:

Equality.

2001

P.S. (2016). In fact, inequality is the most destructive factor today, which makes equality/inequality look like a deep truth, which, nevertheless, concerns basic human needs of the overwhelming majority. This paradox resolves if we realize how far the distribution is removed from 50/50.

Essay 9. On Work

[ethics, wisdom, human qualities, work, computers, machines]

Even a brief look at the Contents of Montaigne's *Essays* tells us that, with all the striking variety of subjects, Montaigne was most of all preoccupied with human nature. Here is an alphabetic list of some selected topics:

> action, affection, age, anger, conscience, constancy, cowardice, cruelty, desire, experience, falseness, fear, friendship, glory, greatness, honesty, honor, idleness, imagination, inequality, intentions, liars, liberty, moderation, passions, pedantry, profit, reason, sadness, solitude, soul, truth, uncertainty, vanity.

Since antiquity and up to the end of the nineteenth century, people perceived history as the result of individual behavior, and the individual behavior as the result of good or bad human qualities, right or wrong ideas, and true or false beliefs. Good results rewarded good qualities and bad results punished for bad qualities. This paradigm looks like a vicious circle because a quality is defined by its results, but as we know, even in physics the most fundamental concepts can be defined only in a circular way.

For a long time, an individual behavior of historical consequences has been attributed to the most visible figures at the top of the ladder of leadership, such as king, emperor, general, Pope, bishop, ideological dissenter, chief mutineer, reformer, and, extrapolating to our times, president and Chairman of Federal Reserve Board. From one angle, they looked like the points of application of mysterious forces of history to the heavy solid bodies of faceless masses. If you push a book on the table crosswise at the corner, it will turn, but if you push it at the right angle to the middle of the side, it will slide. From another point of view, it was their will, knowledge, skills, and character that moved the massive figures on the historical chessboard against an equally determined opponent.

For centuries, history was all about humans, and the authors of antiquity were the first to push the frontier deeper into the jagged and tortured landscape of human nature.
The results of exploration, development, and cultivation of human nature were in public domain. The categories of right and wrong, good and bad, true and false were valuable but essentially free tools. Wisdom was planted and harvested by philosophers and moralists and stocked up for everyday public use and for lean years. Philosophy sifted through enormous loads of mental ore in search for nuggets of wisdom about good and bad, right and wrong, and how to turn one into the other, but every nugget dissolved in

the crucible of critical analysis. Every statement was linked to its opposite like a pair of boots tied up with their shoelaces.

The world changed between the nineteenth and the twentieth century. Human life had to adapt to the life of machines and other human creations. Philosophy had little to say about the transparent and understandable in all minute details machines, and psychology had even less. Imagination? Passions? Glory? The machines of the late twenty-first century may have all that in the future, but today they are still quietly building up internal complexity and accumulating chaos, errors, and attitude problems beyond human control, waiting for the moment when they could jump out of the Microsoft Windows into the brotherly embrace of the schooled but still imperfect humans.

The consequence of complexity is such that the life cycle of an imperfect and annoying software is already shorter than the time needed for its perfection, and this built-in flaw is a deeply human feature from which all the philosophy of sorrow grew. So we are, humans, realizing our flaws only when there is no more time to correct them.

It seems to me that the gradual change and devaluation of humanism came with the Industrial Revolution, when people could see with their own eyes how the unknown in Biblical times machines worked, how their parts maintained an enviably coordinated movement, and, later, how the invisible in Biblical time living cells managed their spectacular molecular business. The scientific education limited the scope of categories of right and wrong to the area of logic. In the business practice, right was what increased profit and wealth. Wrong was what took it away. In politics, the right actions increased power and the wrong ones could cost life. A smoothly working system maintaining its order and not falling apart, was good, right, and beautiful whether it was alive or inanimate.

Right and wrong, therefore, became mostly pragmatic markers, like left and right, because whether a person was moral or immoral mattered less than the final result of the person's action. In the society of civil order and robust economy humans are evaluated like machines, by machines checking crucial functional points, and for machines burying us under targeted ads.

I believe that all this is not to lament about but to accept as the acknowledgment that humans are not alone anymore on the reserved park bench of nature: they put their belongings next to themselves to fill up the entire length of the bench, and their personal effects cast strangely human little shadows.

What do we, millions of new kings of the universe, need to know in the new world with no Kings and no Prophets? What common language can we find with our Things so that we could listen to their guidance and resist their pushing us off the bench?

In the new world, which is very much old underneath, the categories of

system, chaos, order, energy, temperature, probability, complexity, structure, pattern

are the heirs of

true, false, right, wrong, good, bad, beautiful, ugly.

Human nature, with

> action, affection, age, anger, conscience, constancy, cowardice, cruelty, desire, experience, falseness, fear, friendship, glory, greatness, honesty, honor, idleness, imagination, inequality, intentions, liars, liberty, moderation, passions, pedantry, profit, reason, sadness, solitude, soul, truth, uncertainty, vanity

joins the nature of Things with

> aggregation, amplification, charge, concentration, diffusion, dispersion, dissipation, dissolution, distribution, efficiency, entropy, fluctuation, fluidity, force, impact, influence, information, modulation, molecule, performance, radiation, reliability, replication, resistance, rotation, stability, synchronization, work.

It all started with **work** as moral category, equally applicable to humans and Things.

2001

Essay 10. On Clouds and Elephants

[poetry, Lego, mathematics, everything]

There is Everything, and poetry is part of it. Poetry is a combinatorial game, like Lego. Poets combine the words. Nothing seems to be farther from science, engineering, business, and even Lego itself than poetry. It is a long shot in the playfield of Everything. Only by looking from a distance we can see the entire team.

A poet picks up words swarming in his head and connects them in a three-dimensional object: a poem. The first dimension is the line. The words follow each other, connected by sometimes distorted rules of grammar. The second dimension is vertical: stanzas or just lines form a sequence of statements or images, which follow the poet's imagination. They build up the subject matter, if any. There might be none at all. Poetry can be representational and abstract, with everything in between.

Usually, in good representational poetry, there is a third dimension—the hidden, invisible statement which we derive or decode from the written text.

Here is an example from Emily Dickinson .

> I took my power in my hand
> And went against the world;
> 'Twas not so much as David had,
> But I was twice as bold.
>
> I aimed my pebble, but myself
> Was all the one that fell.
> Was it Goliath was too large,
> Or only I too small?

In short, it is about the bitterness of failure. Most of what is said in the above poem can be stated in plain language:

> I decided to do something that was
> apparently very challenging.
> I failed. Was it because
> my task was too difficult or because
> I had not enough strength?

Note that the plain language interpretation will be different with different readers. The best poetry is the one which people understand differently and argue about it.
The subject matter of the poem is something that most of us probably experienced at some time, and it is no such big deal in itself. What is the difference between the prosaic statement and a poem? Why do poets, wriggling like the circus contortionists, compose poetry?

Poetic language is something that we do not use in common life, even if we are poets. We do not hear it at work, in the street, in the speeches of politicians, and do not read in legal and business documents, unless poetry is deliberately included. We hear poetry in lyrics, commercials, and from Charles Osgood on Sunday Morning.

Poetry is everything but everyday language and prose. It is a separate form of speech, not for the purpose of communication, but saturated with links to what is not explicitly said in the text itself but left out. To use the vocabulary of the Web, it is written in hypertext.

The function of the common language used for description and communication is to accurately represent (or misrepresent) certain facts, questions, or directives. Poetry is a play, a game for one, like Lego, which creates a world of its own, having a limited similarity to the real world where the common language is used, but rooted in it, bonded to different areas of reality, author's personal unique experience, and even the reader's experience, not known to the author, of course.

Poetry raises more questions than it answers.

"I took my power in my hand..." Had the author been dominated by somebody before that? Was her power in somebody else's hand?

"And went against the world..." Not really against the whole world? What was it that the author challenged? David was bold enough to fight Goliath. To be twice as bold as he is an obvious hyperbola. Why could not the poet say simply "very much?"

"The pebble" does not mean really a small stone. It is a metaphor, used only because the image of David had been already introduced and the poem displays against the Biblical episode. The pebble, not a big stone is something a woman can throw. Or the pebble means a small, timid act of defiance?

The author fell, although not literally, of course, but what happened to the stone? Did it ever fell on the ground? The author says that only she did fall, nobody and nothing else. The final question does not make sense: if one object is too big in comparison with another, then the other one is too small.

Why did not the author simply tell what happen? What was the challenge and how she failed, and if she did, so what?

The world of poetry and art in general has many more degrees of freedom than the real world. It is the world without no-no's. In the real world elephants stay in no direct contact with clouds, other than through intricate meteorological influence. In poetry they can meet in the same line (Emily Dickinson):

> On this long storm the rainbow rose,
> On this late morn the sun;
> The clouds, like listless elephants,
> Horizons straggled down.

Art is defenseless against mockery but it has the power of time on its side. It is easy but useless to criticize a poet for inconsistency, contradictions, violations of the laws of nature and standards of language, obscurity, extravagance, and bias. We can criticize a poet for banality, smooth blandness, photographic vision, being like everybody else, and having any quality a good secretary possesses.

There is a fourth dimension in poetry that connects separate poems written at different time and at different circumstances into a whole—the work of a particular poet. For example, there is a link between the first poem about a failure (non-success) and the following two about success (non-failure):

This is an early poem by Emily Dickinson:

> Success is counted sweetest
> By those who ne'er succeed.
> To comprehend a nectar
> Requires sorest need.

This is a later one:

> A face devoid of love and grace,
> A bareful, hard, successful face,
> A face with which a stone
> Would feel as thoroughly at ease
> As were they old acquaintances,—
> First time together thrown.

We can compose a book from poems about success written by poets of different nations at different times.

William Butler Yeats put the subject matter of his short poem in its title *To a Friend whose Work Has Come to Nothing*:

> Now all the truth is out,
> Be secret and take defeat
> From any brazen throat,

For how can you compete,
Being honor bred, with one
Who, were it proves he lies
Were neither shamed in his own
Nor in his neighbors' eyes?

The Russian poet Boris Pasternak, better known in America as the author of *Doctor Zhivago*, put a related idea in just two casually inserted lines:

But you must not yourself
tell defeat from victory.

[Some poems by Pasternak in English and Russian]

The fifth dimension of poetry is its links with human culture in general. Here is an excerpt from Adrienne Rich, a modern poet. This is a true example of poetic hypertext.

Two handsome women, gripped in argument,
each proud, acute, subtle, I hear scream
across cut glass and majolica
like Furies cornered from their pray:
The argument *ad feminam*, all the old knives
that have rusted in my back, I drive in yours,
ma semblable, ma soeur!

Furies are goddesses of vengeance in Greek mythology. *Ad feminam* , "to woman," in Latin, is a paraphrase of logical term *ad hominem*, "to man," which means to appeal not to reason but to emotions and prejudices. *Ma semblable, ma soeur* means "my likeness, my sister" in French and is a transformation (paraphrase) of *Hypocrite lecteur!—mon semblable—mon frère!* which is the end of the poem *To the Reader* by French poet Charles Baudelaire and means "Hypocritical reader, my likeness, my brother." It was also quoted by T. S. Eliot in *Wasteland*. What a maze of bonds and allusions spreading through time and space and compressed in a few lines! But even if you do not know all that, you still can understand what the poem is about. Like human brain, poetry can lose big chunks without losing its wits. Sometimes, however, poets just show off.

Poetry is not an easy work. It takes energy, time, failure, and despair. Even a productive poet writes a limited volume of poetry during his life. Emily Dickinson wrote 1,775 poems, but many of them were only short fragments.

Writing poetry is like walking on a tight rope. As with any creativity, the chaotic world of the poetical Lego is ordered by harsh constraints that the poet creates for himself, partly following traditions, partly defying them. In addition, the energy of the poet is spent on trying—like in science—to stay away from what anybody else can say, not to repeat what any other poet said before, and keep a delicate balance between reality and

arbitrary combinatorics. In rhymed poetry, the energy and time are spent also on the masochistic search for the combination of words that would satisfy many contradictory requirements.

The pronouns *I* and *you* in poetry are, actually, the *x* and *y* of mathematics. Like mathematics, poetry invents its own world, but keeps an eye on the real one. The elitist aura of both is a sign of being out of this world. Unlike mathematics, however, poetry means more than it tells. Mathematics, according to Henri Poncaré, is a way to name many things with one name (x=2, 31, α, π...). Poetry insists on naming a single thing by many names (cloud = elephant, feather, stone, blob...) and it builds abundant bonds between objects having no connection in everyday life. The bonds are not totally arbitrary. This is why, although this is not its primary function, poetry is also a way to understand this world.

Here is a poem about clouds by Henri Poncaré , a great French mathematician:

> Ideas rose in clouds;
> I felt them collide until pairs interlocked,
> so to speak,
> making a stable combination.

To make it look like a poem, all I had to do was to arrange the sentence in four lines. Well, *mon lecteur*, *mon frère (soeur)*, all I wanted to say was that poetry and mathematics with some imagination could be two good neighbors of Everything, sharing some bones if not flesh.

2001

Essay 10 is a version of **Chapter 8** of the manuscript:
Yuri Tarnopolsky, *The New and the Different*.

Essay 11. On the Rocks

[tectonics, ethnic fragmentation, balkanization, order, freedom, globalization, frontier, melting pot, gel]

A glass of whiskey on the rocks is a heterogeneous (or fragmented) system. It has a solid and a liquid phases. The molecules of water in ice cubes have almost no freedom of movement. The cubes cannot move freely within the glass because their size is comparable with that of the glass and they have large mass. The liquid contains alcohol, which the cubes do not have. After the ice has melted, the glass will contain a homogenous and weaker solution of alcohol.

A glass of whiskey on ice is a melting pot. Ice melts at 0ºC. Glass melts around 1000ºC.

The Melting Pot was the title of a play that opened in Washington in 1908. It has been a patented buzzword for America for almost hundred years.

It is assumed that the American melting pot has been cooking up a homogenous culture for centuries, but I doubt not only that there is any homogenous culture in the world but also that there is any agreement about what culture is.

Anyway, second and third generation immigrants were losing their language, appearance, and former cultural habits and accepting the dominating culture of the ambient society. Today adaptation can take just one generation. It is always and adaptation to a subculture, however.

With my still not completely adapted eye of a newcomer I see at least three major dimensions of culture in America.

The first dimension, most visible on the surface, is the unified and standardized culture of interaction between people. Greatly influenced by the spirit of individualism, it is seen in behavior, civility, work, business contacts, communication, entertainment, and service. Individualism, synonymous with separation and alienation of people, is generally mistrusted outside America, but here, paradoxically, it unites the population and is as good or better glue as any other culture.

In a highly individualistic society, ideally and typically, one is on his or her own, with enormous degree of freedom, up to complete estrangement from society. An individual competes, theoretically, against millions of others. Conflict, challenge, and oddity make little chance of success except to movie heroes. You have to respect not just your friend and customer but your competitor and even your enemy, too. It is done to keep a stranger at a friendly distance and most feel compelled to play by the rules or let the lawyers fight in the mud.

Individualism is a **universal solvent**, the old dream of inventors. The problem is that it cannot be stored because it dissolves any vessel. It softens all kinds of blocks, chunks, groups, loyalties, and even families. An isolated individual starts looking for a new block to stick to. This liquid culture makes the society very mobile: solid lumps segregate from the liquid phase, in due term melt in it, and new aggregates form in turn. Independence is surrogate wealth: one can buy an allegiance with it.

Complexity in nature develops on the flow of energy from heat to cold, and this very general principle can be applied to all large evolutionary phenomena seen on earth. Evolution of American society reminds me of plate tectonics: formation, movement, and meltdown of large areas of the earth crust because of the hot molten magma underneath and cold outer space above. As result, North America became an isolated continent around 100 million years ago. It is to the process of continental drift that we are indebted by the historically recent discovery of America by the West.

It turns out that our planet has been a melting pot, too. It melts the rocks and casts the melt into a diversity of landscapes. I believe that the American melting pot has always worked that way.

Humans are pack animals by origin, and the cognitive dissonance (see **Essay 8**) between the acquired individualism and inherited collectivism tends to be resolved in a peculiar way: **individualists love to unite around a leader**. In the otherwise muddled American movie *Convoy* (1978), this tendency found an impressive symbolism: maverick truck drivers and their sympathizers revolt against the authorities by flocking into a long convoy moving through the Southwest states without any apparent sense , but with a lot of wreck along the way. I believe that the same pattern of individualists seeking submission to a leader repeats in TV Evangelism and deadly American cults.

The second dimension is entirely collectivist. It is the baffling diversity of subcultures of status, ethnicity, origin, location, occupation, consumption, hobby, family, wealth, and tradition, from the Harley-Davidson bikers to university professors and from Croatian Americans to Militia of Montana, with multiple memberships, or without any formal organization at all. What is done within a subculture might not be done along the first dimension. On the group plane, people may not be completely free and they have to follow some rules and obligations in order to stay in a comfortable environment, but they can always drift to another subculture, move to a distant place, or just follow their own way. An individual in a subculture retains freedom of choice, unless it is drug or mafia culture, although this freedom is what a TV addict has with a remote control in hand.

The third dimension is radically different from the other two. It is the competitive, unscrupulous, and mechanical corporate culture of a business association where everybody, even the single owner, gives up part of freedom and sometimes soul for money. Retirees aside, few people can afford not to work, and, therefore, most have no choice. A company—capitalist or socialist—is a more or less liberal totalitarian mini-

state and it cannot be anything else for the sake of its profitability, survival, and well-being of its employees and stockholders.

In America I realized that the totalitarian character of the Communist Russia was a natural consequence in a country designed as a **single manufacturing company**, strictly private and run by a small group of owners-managers. While you are employed, you don't need to fear tomorrow. People can be, and often are, happy in both capitalist company and totalitarian state.

The second and third dimensions demarcate solid chunks floating in the American whiskey. The analogy with ice, however, is flawed. The ice cubes of society are more labile than those in the glass. A better analogy is gel, like in jelly, GELL-O, or aspic. Gel is mostly water, but a small amount of an additive (gelatin, pectin, agar) creates a quasi-solid structure. Most of our body mass is water gelled with proteins chemically very similar to gelatin (which is a protein). Another metaphor might explain what gel is. The movement of water molecules in gels is constrained by the loose structure of an additive in the same way as riding on horseback is slowed by a forest: the rider can move, but only carefully. Both water and human molecules can gradually move in, out, and through their corporate chunks and migrate to other blocks. There is an equilibrium between the gelled and liquid phases, and gels can melt. Of course, the rigid group structure is created not by an additive or trees but by the rules of the group. The entire physical parallel should not be taken too seriously: it is just a metaphor. Paraphrasing what Picasso said about art, metaphor is a lie that makes us realize the truth. Metaphor is art (see **Essay 10: *On Clouds and Elephants***.)

By the way, the DNA analysis is based on the movement of DNA fragments through gels. The fragments, driven by electric current, have different mobilities, like horse, dog, and monkey running through the woods.

Whatever we call culture, one cannot wake up in the same culture twice. On the surface I have seen big changes since 1987: internet, news as entertainment, progress of women, political correctness, pop stock market, postmodern fringe, mass gun violence, terrorism, consolidation of publishing, commercialization of everything that had been under-commercialized, globalization, and, of course, the changing ethnic composition and fragmentation, alias, balkanization of culture, politics, and education.

Out of context, the expression "melting pot" is ambiguous. Its usual meaning is the pot that melts its contents, and the odd one is the pot that melts down itself, as if it were made of wax, spilling its contents. It already happened once, in the Civil War, but the pot was repaired at a high price, on a high interest loan, with some symbolic payments still due.

Of course, I am interested in everything odd. Can the melting pot melt down?

Anything related to race, nationality, and ethnicity has always been a difficult topic for me: a can of worms, a hornets' nest, a pit of vipers. It is all irrational, tense, dark, and

brooding. It is full of sinister draw, troubling memories, and spiritual minefields. It brings unpleasant discoveries about myself.

Race and ethnicity perform a rather threatening to a liberal society function: it carries a potential apparatus for establishing a hierarchy of domination and exploitation, something like the pecking order and food chain among animals. In good times, people can live together. In bad times, *homo homini lupus est*. But worst of all, any large enough group carries genes of an army.

The greatest blessing of individualism is that an individual does not make an army.

(Disclosure: I am an individualist but not proud of it.)

I have come from a country with over two hundred ethnicities. It was also a melting pot of a kind, like America, with standardized culture and common, for practical purposes, language.

Looking back, I can see the same three dimensions of culture in the bygone Russia as in America. The major difference was the prominence of the second level because most ethnicities lived on their historically inhabited territories and, in addition to the universally taught Russian language and culture, if they wished, could preserve, study, and develop their own language, historical memory, and culture—up to a point.

The diabolical system of residence permits strongly obstructed the free movement of people inside the country, but the Russian melting pot, with some exceptions, worked pretty well. In San Diego after Rhode Island, I had the same, only slightly off, feeling as when I was in Uzbekistan after Siberia. Nevertheless, Russia was a typical empire with its dictatorial Rome in Moscow, and all ethnicities were well aware of that.

I belonged to a minority without any territorial anchor, although historically the Jews in Russia were concentrated in a wide strip along the western border. Anti-Semitism had deep roots in Russian history, popular views, and even classical literature. Although the Communist government kept it at a certain calculated level and did not encourage any extremes, I knew what it meant to face discrimination and hostility.

I knew no culture other than Russian because Jewish culture was practically extinct, but I never felt myself Russian, I carried my Jewish yellow star in my documents, and had to paste one on all the forms necessary to apply for a job, take books from a library, and get married. The airplane tickets, strangely, did not require it. I lived knowing that I was different by birth. In America I was disturbed by an inquiry about my race in response to an application for an academic position.

Because of my origin and past I can understand any form of nationalism, except the virulent and violent one, but I would like to look at the social tectonics from a more detached position.

While protesters expect from globalization the pillage of environment, depletion of American jobs, and exploitation of poor countries, I look at it as a problem of the integrity of the pot, remembering the fate of the empire I was born in.

The Soviet melting pot always seemed stable to me but it has melted down and the chunks of the former empire cling to the soil like boulders after the retreat of a glacier, sometimes pressing down on smaller stones underneath. In the recent past, the chunks were bound by solid ice. I can imagine the terrible trauma that the collapse of the empire inflicted on the ethnic Russians, but for the next generation it will be simply a fact of history. It just happens and it can happen anywhere.

The heat for the cataclysmic event came from the West after the thick insulation that Stalin put between Russia and the West had been gradually, in 1956-1986, dismantled. The wall of insulation could not reach up the near space with spy satellites and missiles and was acknowledged useless. It was also the heat of economics: business does not know borders, and the needs of the moment prevailed over ideology, history, and pride.

Talking about tectonics, we descend onto the ground from the realm of cosmic proportions. The outer space is cold, pierced by radiation and meteorites, frozen to almost zero, empty and stretching over unthinkable distances that make instant communication impossible, but our energy, heat and light comes from it. The Earth is lucky to be rich of water, insulated by atmosphere, and enjoying the incessant flow of productive ("free") energy from the sun.

The former Soviet Union was a stiff, frozen system, designed to function as a clockwork but always showing a wrong time, with the hidden volcanic heat of human emotions compensating for the cold.

The United States still works mostly for its internal consumption, insulated by the continental location and lack of interest in the rest of the world, united by the cult of money and pleasure instead of philosophical or ideological rumination. It is pragmatic, willing to compromise and give credit, tolerant, good-natured, and with a dash of idealism and craze as much as needed to spice up the metallic taste of routine life. The pockets of dissent and discontent are scattered and small, far from networking out into catacombs fit for explosive charges. The society is highly dynamic and capable of self-repair. The picture might certainly look different from the outside and to a critical or upbeat insider. After Russia, people are angelically nice.

There is Europe, on the ideals of which I was brought up, with culture ennobled by centuries of bloodletting. It is the same balkanized for millennia Europe that supplied the first batch of seed to plant the New World shores, as if anticipating the moment when she would be in a dire need of its crop. After my American experience, however, no homogenous national state attracts me in any way. I find American diversity enchanting and dilating my blood vessels. Apparently, the ultimate form of national state does not look attractive to Europeans anymore: its many subcontinents drift not apart but toward a

mini-Pangaea, while their own diversity tends to increase, showing same turnover of matter.

There is Africa, the continent of betrayed hope and great destruction, self-rejecting, as in an autoimmune disease, but guzzling on arms instead of medicines.

There is enormous Asia, the true center of gravity of the world, varying from Afghanistan to Japan, with India, Indonesia, Malaysia, ambivalent Russia, and with China so big that its moon-like presence disturbs night dreams and swings the tides of excitement between greed and fear.

I know very little about South America. In spite of all the contrasts of history, food, music, and climate, there seems to be some vague historical parallel between Russia and the nonexistent averaged Latin America. It follows from the similarity between the authoritarian components of Catholicism and Orthodox Christianity, encouraging both patience and revolt, anarchy and submission, as well as extreme emotions.

This is a very superficial view, of course, because we know what we know mostly from TV and tourist impressions, but we can also look much deeper into different cultures through the microscope of literary fiction. Reading Latin American authors while in Russia, I often thought that the Russians could be the most responsive audience for them outside South America. Too late for both.

What if all that world becomes an economic melting pot and the continental insulation is unwrapped? What can be its source of energy, its heater for the winter and its air conditioner for the summer? Will it melt under the hot tropical sun? Will it freeze, radiating the last heat off into the space? Does the American gelatin have any chance of survival in the melting pot of the future? The global economy sounds like the single company on the globe. Who will own and manage it? There will always be a struggle for control and domination.

Those are idle questions. Any transition state can go either forth or back (see **Essay 8: *On the Buridan's Ass***). To predict the final result of a long sequence of historical transitions under such conditions is risky, almost hopeless (but magnetically attractive) gambling. The chess of history is played if not between God and Devil, then between God's right and left hands. The only conclusion I can draw from the mechanisms of history is that anything is possible.

If the American melting pot is not destined to survive, it may be because of its inability to digest the most numerous (nobody knows how many) ethnicity: the Things (see **Essay 6: *On the Yahoos, or Apologia of Samuel Butler***). It is the third dimension, the globalized economy, the Things riding humans, that could have the last word. The culture of Things is indifferent to banners, borders, ideals, and idiosyncrasies. It can offer both nationalism and ecumenical humanism for sale, neatly wrapped up, and even as a salt-and-pepper set. Companies split and merge as easily as modeling clay and they don't care about geography.

There is a bright side, however: the Things are indifferent not only to race, gender, ethnicity, weight, and sexual preferences, but they also love, in neat pill boxes, the sick and disabled with all their thingish hearts. They even sincerely love the poor: their labor cost is lower.

The rest of the world, with few exceptions, seems to be immune to the individualism of the American kind. The North American continent was the only known phenomenon of the open global frontier on the planet in the age of Industrial Revolution, and the extreme, almost religious individualism was entirely shaped by it. In the rest of the world, including Europe, people lived for millennia on a limited space expandable only by war, which could be waged only by a large group.

The phenomenon of frontier is very general and it repeats, like fractals, on different scales. I could see the phenomenon of the spatial frontier in my own neighborhood. Ten years ago half of it was woods. Now it is completely built up. They cut down even the beautiful catalpa trees with dainty flowers, heart-shaped leaves, pods like fingers of Martians, and seeds with furred gremlin's ears! The little frontier is closed. For the sentimental folks, wasn't our youth an open frontier? Frontier is what seems infinite but always ends.

The second global open frontier—the resources of liquid mineral fuel—shows signs of coming to a gradual closure.

The end of the third frontier—that of science and technology—is by no means certain, at least it seems to be far behind the horizon. Science and technology today play the role of the major mechanism of adaptation of life on earth to the changing balance sheet of energy. It is only in imagination that we can reconstruct from the fossils the arduous march of biological adaptation. We could see with our own eyes, however, how contraceptives, cars, and computers, these wagons of evolutionary pioneers, create a new civilization, as much biological as technological.

Since the closure of the spatial frontier, the American culture seems to be undergoing not so much fragmentation as aggregation, a kind of self-determination, like in the old Old World, where for a long time one could survive only as a big group—the bigger the better. America learns, like everybody else, how to live within the limited borders and limited resources. It started with the skyscrapers, but now even computers boast small footprint. I believe it is a historically natural period not only in the life of any empire, industrial or whatever, but also of any continent, nation, and even ecological system.

I would call the trend "deindividualization," but it sounds like a tong twister. In America it means something that is, probably, not applicable anywhere else: the change of bias from individualism to group mentality. It is a process that distantly and mostly metaphorically reminds of the formation of European nations on the footprints of the Roman Empire.

Fragmentation is usually seen as weakening of bonds between people. I see fragmentation as strengthening of corporate bonds: women are no more just citizens, they are members of the quasi-nation of women, and their corporate power works for them. The minorities of all kinds unite and consolidate into quasi-nations: gays and lesbians, concerned mothers, Blacks, Hispanics, disabled, alcoholics, retirees, libertarians, conservatives, fundamentalists, trade unionists, Christian Coalition, and environmentalists. Microsoft, with its monopoly on Windows ™ is a government (if not a god) in itself: it dictates how the extensions of our brain communicate and work.

This is what it means to be a quasi-nation and a quasi-solid body. It means to cool the whiskey. It means to leave less free space and less choice. It means to increase order at the expense of freedom. The solid body retains its shape, and when it moves, all its points move in the same direction. Only a solid body can be a material for a mechanism that is capable of performing a function repeatedly.

I understand the American fragmentation, contrary to common notion, not as a process of breaking up but as aggregation, a transition from a system of a very large number of highly independent entities to a system consisting of a much smaller number of corporate subsystems where independence is partly lost, but competitive power is increased. The melted stuff solidifies in a labile landscape of corporate forms, and the initial American idea of **individual equality** evolves toward the new idea of **group equality**, which I instinctively like less, not even realizing why. Maybe, if we look at the evolution of the United Nations, based on the group equality, we will better understand the difference. See also **Essay 33: The Corg**.

The American melting pot seems to work, but it is cooling down, like the earth itself, like Europe after the Dark Ages, like Europe of the European Union, after three world wars (one cold), like Africa will, probably, cool down, like the world will cool down, probably, through a series of earthquakes and holocausts, to a more tolerant and civilized community because the more Things humans have the more they value their own lives and the less they want to rob the neighbor, whether across or within the borders. American history seems to display between the hot magma of individualism and the cold of the outer, addicted to authority world. The pot is now divided into the melting zone and cooling zone, with an internal turnover between the two.

If some American subcontinents drift apart, which can certainly happen, it may not be a tragedy, after all. It can also turn the other way around so that an external subcontinent will moor at the underbelly, like the Indian Peninsula to Asia, and blend in. And what is tragedy, after all? In the theater of history for any tragic mask there is a comic one to match, but you never know who in fact is behind which. We enjoy the play most while we do not know the end.



History is an even better source of optimism than whiskey, as far as I am (not really) familiar with both.

2001

Essay 12. On Engines and Games

[postmodernism. Jonathan Swift. Herman Hesse. Laputa. combinatorial culture. commie. Windows 98.]

As a child I read Jonathan Swift's *Gulliver's Travels* (1726) several times but used to skip most of the voyage to Laputa.

From an excellent essay by Russell McNeil I learned that I was not the only one initially disappointed by that particular part of *Gulliver's Travels*. Surprisingly, Swift's images of Laputa had multiple roots in contemporaneous knowledge.

> We need to notice too that the work here is not purely fanciful, even though on first reading it may not seem so. Swift draws nearly all of his satirical material from the genuine articles. Most of the ideas he presents are based on real experiments reported in the literature of his day—and particularly on reports published in the *Philosophical Transactions of the Royal Society* during the last third of the 17th century and the first quarter of the 18th up to and including material published in 1726—the year Swift composed Part III. (Russell McNeil)

One Laputian invention employed in the Academy of Lagado, the random sentence fragment generator, in modern literature often referred to as Literary Engine, seems to be based more on the future than on the material available in Swift's time.

> This marvelously clever computing device is eerily prophetic of a time - our time perhaps—when society would place more value on "instrumental reason" than the more natural forces of reason at our disposal.
>
> Russell McNeil

The Laputians put mathematics and music above anything else. Swift is generous of detail. In Laputa the garments of women

> "...were adorned with the figures of suns, moons, and stars; interwoven with those of fiddles, flutes, harps, trumpets, guitars, harpsichords, and many other instruments of music, unknown to us in Europe."

The dinner matched the dress:

> " In the first course, there was a shoulder of mutton cut into an equilateral triangle, a piece of beef into a rhomboids, and a pudding into a

> cycloid. The second course was two ducks trussed up in the form of fiddles; sausages and puddings resembling flutes and hautboys, and a breast of veal in the shape of a harp."

It looks like the Laputians invented cubism:

> "If they would, for example, praise the beauty of a woman, or any other animal, they describe it by rhombs, circles, parallelograms, ellipses, and other geometrical terms, or by words of art drawn from music, needless here to repeat."

Swift's visionary description of the Literary Engine is worth a full quotation:

> He then led me to the frame, about the sides, whereof all his pupils stood in ranks. It was twenty feet square, placed in the middle of the room. The superfices was composed of several bits of wood, about the bigness of a die, but some larger than others. They were all linked together by slender wires. These bits of wood were covered, on every square, with paper pasted on them; and on these papers were written all the words of their language, in their several moods, tenses, and declensions; but without any order.
>
> The professor then desired me "to observe; for he was going to set his engine at work." The pupils, at his command, took each of them hold of an iron handle, whereof there were forty fixed round the edges of the frame; and giving them a sudden turn, the whole disposition of the words was entirely changed. He then commanded six-and-thirty of the lads, to read the several lines softly, as they appeared upon the frame; and where they found three or four words together that might make part of a sentence, they dictated to the four remaining boys, who were scribes. This work was repeated three or four times, and at every turn, the engine was so contrived, that the words shifted into new places, as the square bits of wood moved upside down.
>
> Six hours a day the young students were employed in this labor; and the professor showed me several volumes in large folio, already collected, of broken sentences, which he intended to piece together, and out of those rich materials, to give the world a complete body of all arts and sciences; which, however, might be still improved, and much expedited, if the public would raise a fund for making and employing five hundred such frames in Lagado, and oblige the managers to contribute in common their several collections.
>
> He assured me "that this invention had employed all his thoughts from his youth; that he had emptied the whole vocabulary into his frame, and **made the strictest computation of the general proportion there is in books between the numbers of particles, nouns, and verbs, and other parts of speech.**"

Later in my youth, I tried a couple of times to read *The Glass Bead Game* (1943) by Herman Hesse, but backed off after the first chapters. Having recently read it in English, I still find *Gulliver's Travels*, including Laputa, captivating and the *Game* laborious. This time I dimly see a link between the two unordinary novels separated by almost 120 years.

In Hesse's imaginary province of Castalia, the Glass Beads Game was more performance spectacle than competition (the German *Spiel* means both game and play). It originated from a blend of music and mathematics, the same two elements that were the essence of Laputian culture.

The Game was performed as composing a sequence of "symbols of universal language," elsewhere called hieroglyphs, probably, descendants of Swift's rhomboids and fiddles.

Today some results of the fusion of mathematics and music can be actually heard on the amazing site The Sound of Mathematics, where one can listen to the music of **π,** combinatorics, in particular, permutations, and other vocalizations of mathematics.

Hesse is never explicit on the rules of the Game but he leaves numerous hints and refers to the Game as "literary productions, little dramas, almost pure monologues."

> "Beginners learned how to establish parallels, by means of the Game's symbols, between a piece of classical music and the formula for some law of nature."
>
> "...the Glass Bead player plays like the organist on the organ. And this organ has attained an almost unimaginable perfection: its manuals and pedals range over the entire intellectual cosmos; its stops are almost beyond number. Theoretically, this instrument is capable of reproducing in the Game the entire intellectual content of the universe."
>
> "On the other hand, within this fixed structure, or to abide by our image, within the complicated mechanism of this giant organ, a whole universe of possibilities and combinations is available to the individual player."

The elitist Castalian Game was a sacred intellectual tradition of the land, designed to fuse science, arts, and religion, but without any utilitarian purpose. On the contrary, the Laputian Engine was intended to produce science and art.

The Game player composed a phrase of carefully chosen symbols according to strict rules and starting with a given theme.

The generator of the Academy of Lagado produced sequences of symbols drawn at random. The meaningful fragments were selected from the jumble. Meaning was, probably, checked against the rules of grammar. The Castalians applied the rules at each move of the game.

With all the differences, however, there are curious parallels.

Both projects:

1. Operate with building blocks, arranging them into sequences.

2. Connect a block with the next one by rules and not at random.

3. Use all available knowledge as the blocks.

It seems interesting to find the roots of this Laputian invention in antiquity (Hesse indicates some historical background for his Game) and trace it up to the principles of artificial intelligence developed in the twentieth century. The first samples of computer-synthesized text were based on the statistics of side by side occurrences of letters and words, calculated from samples of natural text.

Some letters and words are more probable to follow one another than others. For example, when the starting word is chosen, the next word is selected according to the probability of its occurrence after the first, etc. Thus, at the level of letters, **a** is more probable to follow **m** than **q**. At the level of words, **am** seems much more probable after **I** , than **here**, while **here** is probable after **am**. All this seems pure nonsense, but if the real world injects a topic and some key words, a meaningful text can be generated. Swift's remark about "the strictest computation of the general proportion there is in books between the numbers of particles, nouns, and verbs, and other parts of speech" sounds absolutely reasonable and modern.

Neither Swift nor Hesse were interested in the scientific aspect of the problem. They reflected on contemporary culture. This is what I am interested in. Modern culture, however, is already as unthinkable without computer as it is without automobile. The advent of computer meant a combinatorial machine of the Laputian type that could make the Castalian Game and the Laputian research possible and accessible to an average person, as if he or she were given 40,000 pupils to do the chores.

The result of introducing computers to the task of writing was catastrophic: creative writing became easy because word processor could save enormous amount of time on combining and recombining words, editing and printing. The cultural space expanded on a combinatorial scale. Any new combination, however radical and shocking, like a beach sandcastle of wet sand, could dry and collapse overnight, having lost its novelty. But all the culture of combinations required was a lot of sand and some water. The computers made a bit more real the Laputian dream that "the most ignorant person, at a reasonable charge, and with a little bodily labor, might write books in philosophy, poetry, politics, laws, mathematics, and theology, without the least assistance from genius or study." This could be done by compiling a new combination of slightly refurbished old pieces. No denial, my *Essays* use the super-Castalian combinatorial ability of the word processing, Web, and hypertext, and the high school students use the same ability for their essays.

Notably, both the Engine and the Game required a lot of labor. Forty pupils were employed in the Literary Engine and an entire Order with elaborate hierarchy and school system ran the Glass Beads Game. The reason for such concentration of manpower was that both activities were combinatorial in nature.

Combinatorics is a realm of dauntingly big numbers. We can arrange even a relatively small number of elements in an enormous number of combinations. If we have **ten** objects, for example, cardboard squares with numbers from 1 to 10, they can be lined up

(permuted) in 10!= 10∗9∗8∗7∗6∗5∗4∗3∗2∗1 = 3,628,800 different ways, which is the number of permutations of ten elements.

The exclamation mark is a mathematical function called factorial. **Twenty** is the humble number of our fingers and toes, but 20!=221,173,580,276,812,800. The exclamation mark seems very appropriate. This is why a combinatorial game, if unaided, takes a lot of time. For example, to list all the permutations of ten symbols, spending one second for each, would take about 17 hours. For 20 symbols the time grows up to over 100 million years. These numbers give an idea of what the computers have accomplished in human history: they manage large numbers in the same sense as first ancient ships managed large distance and load.

The ships and railways, toiling over distance in Euclidean space, explored and shrunk the globe.

The ships and railways launched the modern civilization of Things.

The computers shrunk numbers. They toiled over the mind space—the space populated by combinations and aggregates of building blocks that had existence only as states of matter, but not as any material objects, not even small beads. Computer and brain consist of many elements capable of being in at least two different states, and the number of all combinations of those states, constituting the state of the overall system, is beyond imagination.

The computers launched the postmodern civilization of combinations.

The term **postmodern** is among most amorphous and disputed. I see it as a contemporary Western **intellectual anti-intellectual** movement (in addition to scores of non-intellectual ones), but to criticize any intellectual trend, even if it is anti-intellectual, is like criticizing pig for its short legs or cactus for its needles: animal or plant, they all are natural and beyond blame.

All we can do is to choose between ideas for our practical purpose as we may choose between a horse and a camel for transportation. This attitude toward ideas, by the way, is typically postmodern and it can be labeled as "anything goes" or "salad bar." Postmodernism is simply here, it is not just a set of ideas but part of culture, including material culture, and we have to reckon with its heyday while it lasts. The topic, however, is so vast, that I cannot engage in it any deeper than this.

All I want to do here is to draw a line from Swift to Hesse to the postmodern mindset. This turns out easy to do in a weird way. The principles of random text generation that took its origin from the Literary Engine were in fact used to generate postmodern texts, grammatically correct but meaningless. Examples of the essays produced by this post-Laputian Literary Engine can be found on the Web.

Postmodern texts are easy targets to ridicule. One can open, for example, *Anti-Oedipus: Capitalism and Schizophrenia* by Gilles Deleuze and Félix Guattari, The Viking Press, New York, 1977. I am still not sure it was not a hoax. Anyway, it represents a phenomenon of the entire culture, not just of an academic playground.

As we are inclined to travel to rare and exotic sites on the globe, we are attracted to the rare and exotic combinations of sensations, impressions, functions, ideas, and even Things. Postmodern culture is a very thin layer of the total Western culture, but it is the noisiest. Its function is to attract attention. In essence, it is combinatorial: it takes known elements and combines them in a different way. The book by Deleuze and Guattari, for example, combined ideas of Nietzsche, Marx, and Freud with some original—and rather appealing to me—ideas of authors about economics and culture in terms of flows. As examples, not metaphors, they list all possible human bodily fluids.

As another example, anatomy and realistic sculpture have always been linked: the artists needed some knowledge of anatomy to make realistic presentation of human bodies. A new combination uses anatomy as supplier of building material for sculpture. Chemically treated and artistically dissected human bodies are exhibited as art objects.

The postmodern culture displays around stardom and fringe with nothing in between for a simple reason: what lies between is so vast that any reasonable choice is impossible and the traveler is lost. The extremes—the summits and the rifts—are spectacular but the woods and prairies of the planes are mind-numbing. This is why the commerce competes for a limited space on the shoulders of movie stars and basketball players and pays huge money just for a link of a merchandise to the star name. This is why the publisher is concerned about a powerful endorsement by a star more than about the content, the author looks for a yet unheard combination of human deviances, and the movie producer looks for the script with the largest possible global catastrophe or with Siamese twins as main characters.

It is the enormous productivity of the combinatorial culture—"untrammeled and amateurish overproduction in all the arts," as Herman Hesse noted— that leaves a tiny space to manageable and rational choice among accidental and emotional one. Nobody has any time for this.

I believe in a strong commercial component of postmodernism. Although the theoretical sources go back as far as to Karl Marx, the origin of postmodern philosophy is usually dated by the period after WW2. It was a time of a big change, after the collapse of many human beliefs and hopes, ideologically comparable with the collapse of the Roman Empire. It coincided with the big change in economy (see **Essay 7**) and the advent of the combinatorial culture. Only science and technology seemed a firm ground.

Computers did not create postmodernism but they became a vehicle of exploration and expansion of the vast mental space of sciences, technology, and, finally, humanities.

If you want your voice to be heard in the pandemonium, you need a shock wave of the woofer and a shrill of the whistle, and postmodernism became ideology of self-advertising. In the perpetual universal dance, every position and every dancer is equally justified, but the loudest stomp overpowers the rest of 221,173,580,276,812,800 permutations of human fingers and toes.

What Herman Hesse himself heard in 1943, in the shielded from the war Switzerland, I believe, was the sound of many hooves beating the tracks of the future. The two points—the Engine and the Game—define a straight line that not only passes through our time but also goes much farther into the future.

Freedom is the freedom to combine, isn't it?

Our contemporary culture has been vilified so much—but enjoyed even more—that I have no dirt to add. Being more on the side of enjoyment and finding no joy in criticism, I would rather engage in self-criticism, evoking what one of the Hesse's characters said about the Glass Beads Game: "sheer irresponsible playing around with the alphabet into which we have broken down the languages of the different arts and sciences. It's nothing but associations and toying with analogies." I am terrified to see how technology dictates me what to think and how to express my thoughts, but it is only because I was born in different times. Honestly, I don't believe those times were in any sense better.

I have something on my mind, a picture of the world, and combinatorics is an important part of it. Artistic culture has always been combinatorial in nature, as we can see, after Vladimir Propp, even in the mythology and folk tales. This aspect of culture was explored by a predecessor of the aggressive postmodernism: structuralism , a direction of thought so important, influential, and so much defiled and trampled by its own children (the grandchildren will probably make peace), that postmodernism is sometimes called post-structuralism. But structuralism, as well as the distinction between the new and the different, is subject for separate essays. The peculiarity of postmodernity is that the rules of combination are extremely relaxed and the criterion of selection is nothing but sales. If over half a century ago Niels Bohr believed that any deep truth is as true as its opposite (see **Essay 8**), today his thesis is transformed into: any truth is as true as its opposite.

It is the combinatorial explosion of the modern composite (artistic, scientific, technological, political, material, religious, and tribal) culture that I regard as the core of the current fascinating period of history labeled as postmodern and strongly influenced by large-scale peace, cheap oil, computers, and the Roman power of America? The label came from Paris.

According to James Morley , who saw the beginnings of material postmodernism in architecture,

> The result of this was an ironic brick-a-brack or collage approach to construction that combines several traditional styles into one structure. As collage, meaning is found in combinations of already created patterns.

> Following this, the modern romantic image of the lone creative artist was abandoned for the playful technician (perhaps computer hacker) who could retrieve and recombine creations from the past—data alone becomes necessary. This synthetic approach has been taken up, in a politically radical way, by the visual, musical, and literary arts where collage is used to startle viewers into reflection upon the meaning of reproduction. (James Morley)

The evolution of the Windows software from a practical tool to the frivolous, flirtatious, and fickle Windows 98 and from it to the hustling pushy Windows XP is yet another illustration of the postmodern spirit of total commercialization in the infinite combinatorial universe where a human cannot find the right way and must be guided by a *commie* (meaning a **combination** of communism, commerce, and combinatorics). First, we give you enormous choice, next we will lead you to the right one, opening yet another little duct for a flow of money milk, remarkably consistent with the imagery of Deleuze and Guattary.

Something really dramatic happened after WW2 (see **Essay 4**). Luckily, I have witnessed it but I don't quite understand what it was. At my age, I understand everything about myself. This knowledge is useless because I cannot change anything. Neither can I change anything in the course of history. Neither do I want to. But the process of understanding, even the bitter self-understanding, is the highest delight known to me. Well, love and sex are also understanding, delightfully useless.

The best things in the world are useless. I am greatly tempted to send my affectionate kiss to any combinatorial play of mind.

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NOTE:

A great, unique, and somewhat one-sided look on postmodern culture:

Kenneth J. Gergen, *The Saturated Self: Dilemmas of Identity in Contemporary Life*, New York: Basic Books, 1991.

Ten years after, the picture is more pastel and less neon. The fad fades.

2001

Essay 13. On Numbers

[order, Confucius, US tax code, combinatorial culture, poset, complexity, bureaucracy]

If not reason then vision is definitely something we share with animals. It reduces the need of thinking because, unlike the mental space, the Euclidean space around us is ordered. We can take the largest peach and go to the closest seat almost automatically. The order of the space means that for every two spheres and two distances we can tell with decent accuracy which one of two is larger. If vision does not help, we can measure the differences and convert them into the numerical food for thought.

In search for a landmark on the flat vastness of the combinatorial culture (see **Essay 12**), some simple measure, like distance, height, width, time, and quantity—anything numerical—could greatly help. As a matter of fact, such measure exists, and of course it is money. We can buy the cheapest air ticket with our eyes closed.

With a numerical measure on hand, we can compare values of different things as if we actually saw the landscape of values. The search for the highest or the lowest point of the combinatorial landscape (or landfill) could become quite mechanical. Money performs its function because it is number, and rational (i.e., integers and fractions) numbers used in commerce are perfectly **ordered:** for any two different money values we can tell which one is larger than the other. Money, like any number, brings order and sense of direction into our otherwise chaotic life, so that we can navigate it under clear star-studded skies and not in blind fog and can find a good deal on air ticket, hotel, and computer memory. By reducing everything to the simple one-dimensional space of price, money softens the unbearable complexity of the world we have created. In other words, money introduces a kind of **geometry** in our life. With money we are relieved to be closer to animals and need intelligence more for earning than for spending.

There are things, however, that have no price tag for. Despite all its totalitarian might, money does not measure political power (at least, not completely), beauty, truth, knowledge, and virtue, although all can be occasionally bought and sold. The parameters of human nature that meant so much for Montaigne, do not do too well on the market of modern democracy, except for power and beauty.

As far as beauty is concerned, there is a simple procedure of ordering: beauty pageant. The contestants are compared with each other and lined up as ordered set. The place in the competition is a number but it has no absolute meaning, because somebody with a lower place can still win in another competition. All contests are relative. All money is absolute, and no collective judging at the pageant of money is necessary.

We are moving toward the market price for health and life, but general ideas are still difficult to evaluate in terms of money, and moral qualities are even more so. But if we do not have any quantitative measure, how can we choose between values, behaviors, and ideas that are not listed in religious commandments as *do* and *don't*?

Consumer ratings and polls play the same role in evaluating quality of goods, performers, politicians, sports personalities, and authors as beauty pageants, and with the same limitations. They work by placing the objects of rating in ordered sets. This can be done if the relation, for example, "more" or "better," can be established for any two objects.

The knowledge of what is good and what is bad, whether true or false, reminds of force in physics: it directs the movement.

The problem with a diverse pluralistic democracy is that there are many different ethical standards. Another problem is that corporate standards can override the personal ones. With ethics there is so much confusion that the modern society, drowning in combinatorial flood, seems to abandon the risky ethical standards at all. Money offers simplicity.

It turns out that the non-monetary numerical currency has always been used to maintain social order. In authoritarian societies, however, the price list was short, written by a single hand, and designed to stand for a long time.



Teachings of Confucius, who lived around 500 B.C., seem to be directly aimed at controlling combinations, search, novelty, excess, and chaos. His main idea was that preservation of order was the best way to happiness. If we start to implement this concept, we have to maintain the same order today as a year ago, and so, going back step by step, we come to the oldest known order, which for Confucius was embodied in the writings of ancient sages. The ideas of Confucius are just combinations of terms and anybody could express them or rediscover. They can be found in Plato, ancient Indian philosophy and, probably, in any modern chicken soup for the soul. All we need is a set of terms, and moral terms are more or less universal, I think, because, with the exception of worshipping a superhuman being, they find roots in animal behavior. Whether dogs worship their uber-canine masters I don't know, but I doubt it.

Confucius was as contradictory as any major religious teacher and this is why his mostly non-religious system, actually, became a religion. The same happened with Marx and Lenin. If a book is free of ambiguity, it cannot sprout religion. The contradictions require an institution of selected experts and functionaries to question the text and to apply the old text to the new reality and the old norms to the diversity of human behavior.

One of the four original sources of Confucianism is Analects of Confucius, from which the quotations below are taken.

Confucius was neither a retrograde nor an obscurantist.

> The Master said, 'If a man keeps cherishing his old knowledge, so as continually to be acquiring new, he may be a teacher of others.'
>
> BOOK II, CHAP. XI.

He suggested the middle road in any venture but did not disapprove the venture itself.

I like to think that the conservative attitude toward life is always inspired by some kind of a shaky balance between the supply of energy and its dissipation. When large numbers of people are well today but can be on the verge of extinction tomorrow, as it happened in Chinese floods and Russian famines, not to mention the wars and revolts aggravating Chinese history, a cold conservative system has better chances of survival than a diverse and fluid structure.

The source of energy for China was not just the solar radiation but, in addition to it, the fertile river valleys that carried vast amounts of silt and, like the Nile of the pharaohs, could sustain the imperial food chain where the emperor, his officials, and his subjects depended on each other. Water does not always deliver its promise and needs a centralized power to control it, maintain the distribution of moisture over large territories, accumulate the crop, level out its consumption over time, as Joseph taught the Pharaoh, and defend the empire against the non-agricultural invaders. The less reliable the harvest, the more authoritarian and vertically stratified the social structure. The Chinese rivers had very nasty temper, periodically throwing devastating floods.

The same could be said about the Russian climate in which a decent harvest is never to be taken for granted. The Emperor at such conditions has the true mandate of Heaven.

Confucius treasured the virtue of propriety (the following of the established order) above all. How did he manage to measure it? It seems that he understood order as modern mathematics does. He tried to order the set of moral qualities without recurring to numbers, which leaves only the tool of comparison.

> Tsze-kung said, 'What do you pronounce concerning the poor man who yet does not flatter, and the rich man who is not proud?' The Master replied, 'They will do; but they are not equal to him, who, though poor, is yet cheerful, and to him, who, though rich, loves the rules of propriety.' BOOK I, CHAP. XV. 1.

In this story we find four combinatorial human types:

1. The poor man who does not flatter.
2. The rich man who is not proud.
3. The poor man who is cheerful.
4. The rich man who loves the rules of propriety (i.e., order).

If they are to be judged at a virtue pageant, how would they stand? I wonder how Confucius would order types 2 and 4 or the cheerful rich and the cheerful poor men.

Obviously 3 and 4 are above 1 and 2, but what about the position within the pairs? Basing on the sole maxim, it is impossible to tell.

A set of integers, for example, from 1 to 10, is an ordered set because for any two numbers one is more than the other. The linear sequence 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and for that matter, any lined up objects, even identical marbles, are an ordered set because for any two objects one is farther to the right (or left) than the other. Order is any relation defined in a certain way.

> In mathematics, a set is ordered by a certain relation (for example, one is more than the other or one is further to the right than the other), if
>
> * any two different members of this set always have this relation,
> * the relation can never exist between two equal members, and
> * the relation is transitive (i.e., if 3>2 and 5>3, then 5>2).

In **partially ordered set**, some members have this relation and others do not.

The four types from the Confucian maxim form what is called partially ordered set. For some two members of the set we know the relation between them, but for others we do not.

Let us look for the clues in the rest of Analects..

> 1. When the Master went to Wei, Zan Yu acted as driver of his carriage. 2. The Master observed, 'How numerous are the people!' 3. Yu said, 'Since they are thus numerous, what more shall be done for them?' 'Enrich them,' was the reply. 4. 'And when they have been enriched, what more shall be done?' The Master said, 'Teach them.'
> BOOK XIII, CHAP. IX.
>
> The Master said, 'Riches and honors are what men desire. If it cannot be obtained in the proper way, they should not be held. Poverty and meanness are what men dislike. If it cannot be avoided in the proper way, they should not be avoided.
> BOOK IV, CHAP. V. 1.
>
> The Master said, 'The mind of the superior man is conversant with righteousness; the mind of the mean man is conversant with gain.' BOOK IV, CHAP. XVI.

This seems to put enlightenment over wealth, wealth over poverty, and enlightenment over ignorance. But what is better, to be humble or to stay away from flattering? To be rich and not to flatter or to be rich and cheerful?

The Confucian scale of moral values is based on partial order. He consistently uses pairs to establish the superiority, but does not exhaust all possible ones.

> The Master said, 'They who know the truth are not equal to those who love it, and they who love it are not equal to those who delight in it.' BOOK 6. CHAP. XVIII

This might make reading Confucius a delight, but leaves a wide margin for guessing.

> 1. Tsze-kung asked which of the two, Shih or Shang, was the superior. The Master said, 'Shih goes beyond the due mean, and Shang does not come up to it.' 2. 'Then,' said Tsze-kung, 'the superiority is with Shih, I suppose.' 3. The Master said, 'To go beyond is as wrong as to fall short.'
> BOOK VII, CHAP. XXXII.

But what is more wrong? I would ask the Master. Wasn't the purpose of Zen Buddhism, originated in China, to protect the Master from too many questions?

Although Confucius ordered some pairs, large number of moral combinations is practically impossible to order and to evaluate a man on the Confucian scale is not an easy business. If it were, Confucianism would be an obvious truth and not a deep truth (see **Essay 8**).

To order the combinatorial variety of real life and achieve maximal order and certainty has been a very much understandable but never attainable goal of any authoritarian government since ancient empires.

The Russia of the czars, an imperial neighbor of China, maintained its order not through any philosophy but through the religion in which the Czar had mandate from God, like in China. Peter the Great established a very rigid hierarchy of social service. The *Table of Ranks* contained fourteen ranks, equivalent to the same number of ranks in the army and the navy.

Here it is:

CIVIL SERVICE RANKS OF RUSSIAN EMPIRE

I Chancellor	VIII Collegial Assessor
II Real Secret Councilor	IX Titular Councilor
III Secret Councilor	X Collegial Secretary
IV Real State Councilor	XI Ship Secretary
V State Councilor	XII Provincial Secretary
VI Collegial Councilor	XIII Senate Registrar
VII Court Councilor	XIV Collegial Registrar

A peculiar consequence of this system was the pervasive Russian obsession with superiority, real or fake, in dealing with a stranger or an equal, or even a foreign country. This is why Russia has been fixated on self-proclaimed greatness throughout its history.

The ranks and their monetary representation are very ancient invention. In the Code of Hammurabi, the king of Babylon who lived in the eighteenth century BC, we find:

> 202. If any one strike the body of a man higher in rank than he, he shall receive sixty blows with an ox-whip in public.
> 203. If a free-born man strike the body of another free-born man or equal rank, he shall pay one gold *mina*.
> 204. If a freed man strike the body of another freed man, he shall pay ten shekels in money.

Democracy, which instead of distinction between classes tends to turn to distinctions between individuals, faces a deluge of complexity.

The respectable US Tax Code is one of the latest repercussions of imperial bureaucracies and, paradoxically, the most complicated product of the struggle with complexity. In essence, it is a never-ending quest for lining up every droplet of the combinatorial ocean of human circumstances to the perfect linear order of the Tax Table, where the figures of income form ordered set. In a sense, it is yet another historical attempt to order a vast number of combinations, traceable to Hammurabi. This time, however, the code deals with many millions of individuals or families instead of a dozen or so social classes, estates, and casts. In 1984 it was 19,500 pages long, and in 2001 it counts 45,662 pages, no doubt, due to the fecundity of computers. Here is a sample:

Amendments

> 1986 - Subsec. (a). Pub. L. 99-514, Sec. 102(b), substituted subsec. (a) for former subsec. (a) which read as follows:
> '(1) In general. - In lieu of the tax imposed by section 1, there is hereby imposed for each taxable year on the tax table income of every individual whose tax table income for such year does not exceed the ceiling amount, a tax determined under tables, applicable to such taxable year, which shall be prescribed by the Secretary and which shall be in such form as he determines appropriate. In the tables so prescribed, the amounts of tax shall be computed on the basis of the rates prescribed by section 1.... (etc.).

Ordered set, or, to put it differently, a gauge or a ruler, is the golden dream of any bureaucracy. The Federal Tax Code, driven partly by the liberal intent to assist various disadvantaged groups and milk some advantaged ones, is the roster of inequality and the best proof that equality does not exist. It is the embodiment of totalitarian frame of mind: not to miss anything. Bureaucracy is the steamrolling of priorities.

Interestingly, the modern penal codes solve the problem of complexity by setting the range of punishment (unthinkable for taxes!) so that the individual combination of circumstances can be taken into account, which is an enormous progress since Hammurabi.

Democracy started as public forum and ended as a public market place where anything goes. In our time, what people buy is more important than how they vote. The policy follows the economy as the driver follows the road. The motto is: buy first and vote later. The market democracy generates enormous number of combinations that cannot be completely linearized, and money, income, and prices take advantage of this complexity by pushing out any other scale of values, impractical in the current Era of Large Numbers when money is easy on morals and heavy on litigation.

To hike over mental distances is my favorite kind of tourism and the tourist's observations are by necessity superficial.

I think about history of USA, Russia, China, Babylon, and for that matter, any nation as a precious pool of social and cultural genes, some unique and others universal, like the genes of basic biochemical metabolism are more or less similar throughout the species. I find the task of mapping the human social genome fascinating. We could be humbled by discovering that we carry most genes, or, rather, memes (see **Essay 6**), common with those of very distant times and places. In the social genetic engineering of the global future, some can be found harmful and some beneficial for the needs of the moment, but the winds could always change. Besides, the genes and memes express themselves without asking for anybody's permission.

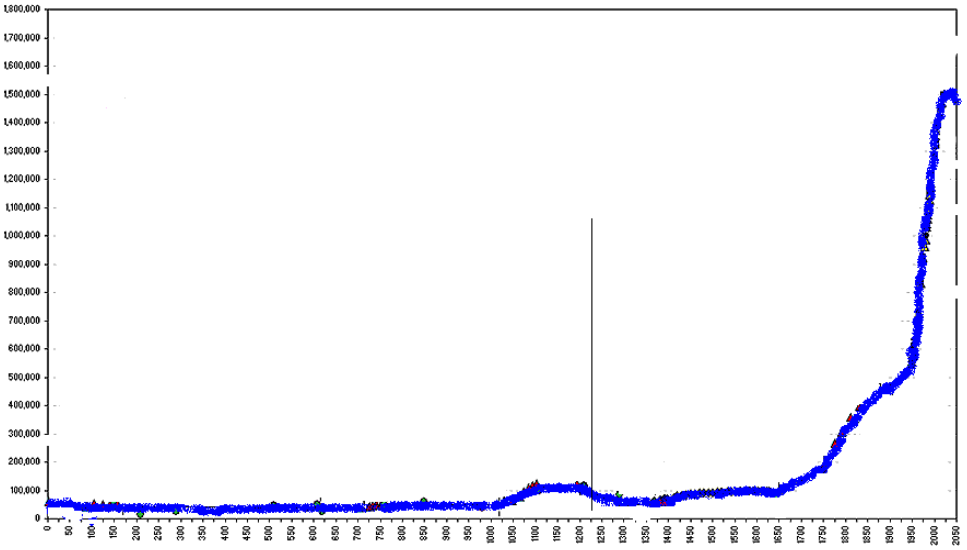
I believe, the following tourist's observation presents an example of socio-genetic cross-pollination. In the following charts I modified the data taken from an excellent source of in-depth information on China.

The first chart plots the population of China from 1 AD to 2050 AD (projection).

We can see from the numbers that something dramatic happened twice, in the middle of the eighteenth century and in the middle of the twentieth century (compare with **Essay 4**).

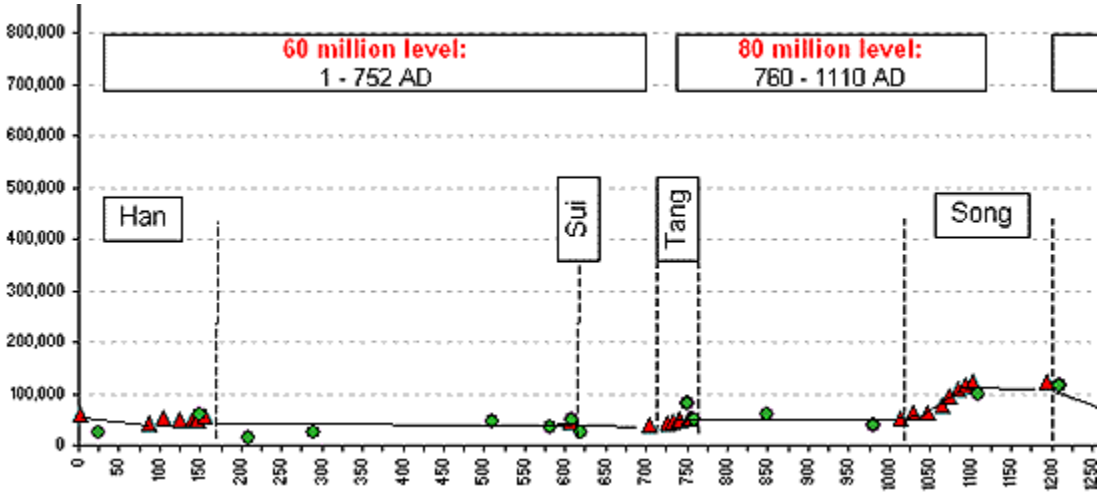
The last Chinese dynasty, Qing (1644-1911), brought an unheard of peace, prosperity, and governmental efficiency to China and fell the victim of its own success because of the overpopulation and the alien pollen brought to China by the winds from the West. If something was to blame, it was the Industrial Revolution and its political consequences plus the Western attempts to colonize China.

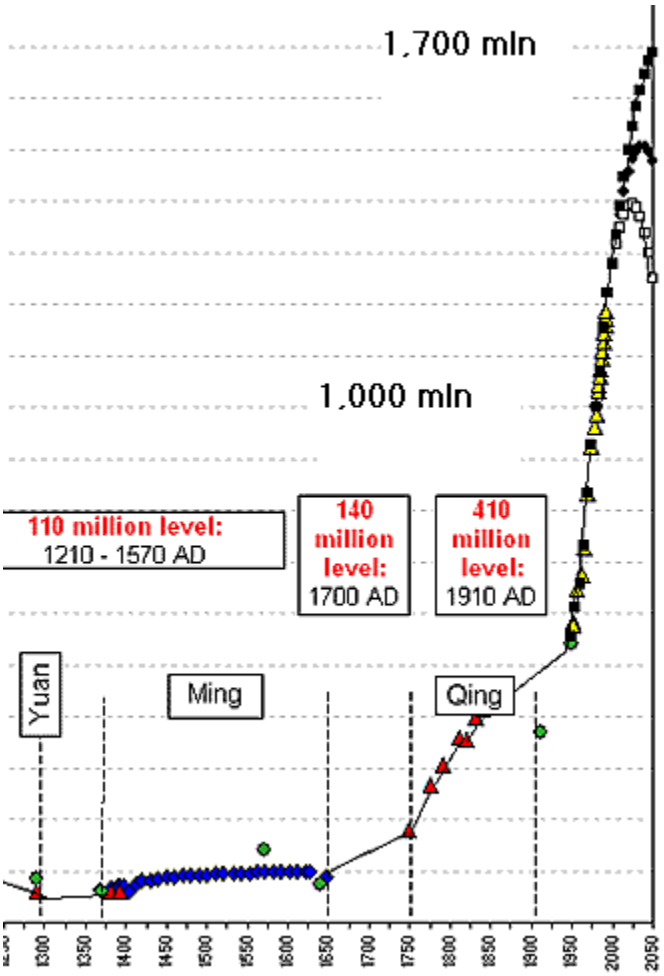
The second time it was the Marxist and Leninist reaction to the Industrial Revolution, also called revolution, the proletarian one. The population skyrocketed, and the authoritarian Communist government, finally, attempted to undo the numbers.



Above: population of China between 1 AD and 2050 AD. The detailed plots left and right of the vertical line (1290) are presented below. The future estimates are given in three versions.

Source: http://www.iiasa.ac.at/Research/LUC/ChinaFood/data/pop/pop_21_m.htm





This is what the power of large numbers packed into limited space can do.

A big small number:
3.14159265358979323846264338327950288419716939937510582097494459230781640628620899 8...

2001

Essay 14. On Taking Temperature with a Clock

[temperature, range of variations, music, chaos, order, rubato, Bach, Beethoven, Bartok]

Baron Munchausen once had to travel by post carriage during a ferociously **cold** Russian winter.

> The winter was then so uncommonly severe all over Europe, that ever since the sun seems to be frost-bitten. (*THE SURPRISING ADVENTURES OF BARON MUNCHAUSEN*, By Rudolph Erich Raspe, Chapter VI)

On a narrow road he made the coach blow his horn to warn the oncoming travelers. Not a sound, however, could be extracted from the horn.

Having arrived at the inn, the coach hung the horn on a peg near the kitchen **fire**.

> Suddenly we heard a tereng! tereng! teng! teng! We looked round, and now found the reason why the postilion had not been able to sound his horn; his tunes were **frozen** up in the horn, and came out now by **thawing**, plain enough, and much to the credit of the driver, so that the honest fellow entertained us for some time with a variety of tunes, without putting his mouth to the horn - The King of Prussia's March - Over the Hill and over the Dale - with many other favorite tunes; at length the **thawing** entertainment concluded, as I shall this short account of my Russian travels. (Chapter VI)

Travels and Surprising Adventures of Baron Munchausen was originally written in English (1785) by the German author Rudolph Erich Raspe (1736 - 1794). By linking music and temperature, the quoted story gives me a starting point for my own story.

The definition "music is organized sound" is attributed to Edgar Varese (1883-1965), a composer who did a lot to disorganize music by expunging melody and harmony.

Edgar Varese might be right but noise can also be organized, and so are natural and artificial sounds, whether pleasant or irritating. Music is what we call music and sell as music today. Yesterday music meant something different. Some sound illustrations can be found at The Classical Archives site.

Let us look at three composers, each born a century apart: Bach, Beethoven, and Bartok.

Bach, not just revered by everybody but also admired by many, leaves me, with a few exceptions, **cold**. Beethoven is, for many reasons, the highest peak in the evolution of

music—the opinion I share. Bartok leaves most fans of classical music **cold** but he is my favorite.

My choice does not represent music as a whole because all three are devoid of romanticism, another powerful branch of musical evolution that I enjoy, too. I prefer music without illusions and sugar, but I love music as a whole, as a parallel world in which a daydreamer can find a temporary shelter from daylight.

Listening to Johann Sebastian Bach (1685-1750) we can hear not only a very regular rhythm but also a rather even distribution of sounds in time. Long pauses and dissonances are absent and sharp dynamic contrasts are rare. The music is well organized, very regular, and even predictable over significant segments. What is hardly predictable is the combinatorial richness of the pieces. There are listeners who worship Bach as the source of heavenly peace, harmony and perfection, others as an ideal of predictability and order, and some, I suspect, put it as an ice pack on the bruised soul. Bach not only creates his own universe, right before our eyes, but also the laws for all subsequent ones. If none of the components of music employed by Bach remains, music ceases to exist to my ears.

Ludwig van Beethoven (1770-1827) departed from the canons. His sound is distributed less evenly and the pauses and long repetitions appear. His music is full of dynamic and orchestral contrasts, complexity, heroic power and tragedy, anxiety, longing, despair, and idealistic beauty. It seems to comprise the full range of human emotions ennobled by intellect, the range so wide that nobody could ever cover his range afterwards. Remarkably, it is still mostly ordered and regular, despite an overwhelming number of innovations. It is about the worldly life, but mostly above its passions.

After Beethoven there was little left unexplored in the classical universe created by Bach. Meanwhile, the Industrial Revolution was turning the world around, and the historically brief but incredibly dense wave of musical romanticism rolled over the nineteenth century world stitched together by steamships and locomotives. There is a relation between both, and as a seed for another essay, I can only note that even the cast flywheels of the early steam engines were embellished as if the engine were Empire furniture, while it was sheer power.

By the time of the WWI, romanticism—the music of illusions—was gone.

Bela Bartok's (1881-1945) music, as inventive as Bach's and Beethoven's, is nervous, dissonant, irregular, violating all the rules of Bach's *Well-Tempered Clavier*. It loses a distinct rhythm in the "music of the night" of his slow pieces (for example, in *Music for Strings, Percussion, and Celesta),* or takes an ominous mechanical beat (for example, in *Miraculous Mandarin).* The heavenly beauty and peace disappears from Bartok's music completely, as it disappeared from the world he lived in. The melody is cut into short and unadorned phrases but the rhythmic diversity is rich and intricate.

While Beethoven could find harmony and greatness in the struggle of the individual against the world, Bartok accepted the irreconcilable conflict, with little hope, but no resignation.

It seems to me that Bach talked to God, Beethoven to equals, and Bartok to himself.

All three composers left piano works of pure combinatorial inventiveness: Bach in his *Clavier* and *Inventions*, Beethoven in *Diabelli Variations*, and Bartok in *Microcosm (Mikrokosmos)*. None of the three composers can be called "sweet." Mozart was sweet or, rarely, bittersweet.

Bach was recognized as a great composer only 80 years after his death, Beethoven's music initially was too **hot** and passionate for his contemporaries after Mozart and Haydn, and Bartok still grates upon the ears tuned to Beethoven, Schubert, and Chopin.

Dmitri Shostakovich (1906-1975), one of the last big classical composers, in his latest symphonies and quartets was reminiscent of Bartok, but in general he was much **colder**. I hear in his palette Bach's monumentality, Beethoven's passion, and Bartok's dissonance intentionally combined in almost postmodern manner. Shostakovich lived in time of fear.

Distinct rhythm was the necessary and sufficient condition of classical music, and it still is in folk and popular music. At its beginnings, music was very rigidly organized, but with time the restrictions loosened a lot. The composer prescribes rhythm as metric pattern consisting of sounds of different duration, accents, and pauses. The composer also marks tempo, traditionally, in Italian, as fast, slow, etc., and dynamic effects.

There is a curious tempo employed mostly by the romantic composers of the period after Beethoven: *tempo rubato*. In Italian *rubare* means to steal: duration is stolen from one note and added to another. *Rubato* makes some notes shorter or longer than the others in the bar so that the total rhythm is preserved. *Rubato*, therefore, applies not to the tempo but to its regularity. The following two sequences symbolize regular and *rubato* tempos by having the same length but variable segments:

a a a a a a a regular
a a a a a a a *rubato*

The effect of *rubato* is emotional tension and expressivity, the **warmth** of music, typically represented by Frederic Chopin's *Nocturnes*. The irregularity, freedom of composition, fuzziness, abrupt changes or dreamlike fluidity, swinging between joy and sadness, positive attitude to life and its stages, rich chiaroscuro, nuances, and **warmth** are typical for romanticism and, actually, most of the music starting from Hector Berlioz (1803-69) to Claude Debussy (1862-1918) and Sergei Rachmaninov (1873-1943).

The **warmth** of the violin and cello sound, so different from the fixed sound of piano, comes from the very design of the violin with its smooth fingerboard that makes the sound less predictable. The performer places his or her fingers with spontaneous or deliberate variations. This variability of the sound is widely used for expressive effects.

One of them is *vibrato*, when the sound fluctuates around a certain tone due to wavelike movement of the finger. *Glissando*, the continuous sliding of the finger between two tones, can imitate human groan or shriek of joy.

The human voice is the richest instrument, completely devoid of any fixed ordering, but not all singers are able to use the dramatic possibilities of its chaotic potential when technical difficulties and exertion divert most of the energy.

Here are some notes of teachers of music about *rubato*.

> Rubato is a nuance in music with all elusive definition. It is at best learned experientially through listening, analyzing, observation, and imitation, but not necessarily in that order. Even composers editors, and performers have a problem with exactly how this "device" should be used. The "bending of time" will probably not be interpreted the same way by students, teachers, or even advanced performers.
>
> How then, can it possibly be taught? It would be impossible to devise rules for the introduction of rubato for all students or predict when the first magic moment of stretching for expressive purposes might occur. (Miriam Byler)
>
> Rubato is not a mathematical concept and cannot be taught by mechanically adding to one note and subtracting from another. The purpose of rubato is to add expression to the music. The key for teaching this concept is the imagination. Each student has different life experiences, background, exposure to the arts, and level of sensitive listening. These either help or hinder the student's ability to imagine. (Sue Shannon)

But of course, *rubato* is a mathematical concept: it means increasing entropy of a temporal sequence. It means relaxing control over tempo, increasing disorder, and making music less predictable. This is what typically happens with somebody experiencing strong emotions, anxiety and agitation, with a nation in a turmoil, government in a scandal, outraged community, disgruntled employee, collapsing political structure, automobile tire manufacturer with loose quality control, disorderly football fans after their team wins, economy that had lost ground, a lover having discovered betrayal, and any physical system when **temperature** rises.

In *Joseph in Egypt* by Thomas Mann, Joseph learns about the interest of Potifar's wife in him.

> Joseph's heart—that heart which Jacob, far away, believed long stilled in death, whereas here it was in Egypt, ticking on and exposed to all perils of life—that heart stood a moment still, then, as a heart does, throbbed the faster in order to overtake its lost beats. (Volume 2, Part *The Smitten One*, Chapter *Threefold Exchange*)

Rubato means that the **temperature of the tempo** goes up.

Of course, we have to be careful while attributing chaos to a performance. A trained performer can imitate chaos in a **cold** calculated way. Actors of the silent movies

substituted the broken, jolted and exaggerated facial expression and gesticulation for the absent speech. A cursory lover moves in a metronome-like mechanical rhythm, while a refined one improvises variations of the meter and tempo. Computer, like a skilled performer, can only imitate chaos, but I swear that the Microsoft software that I use has some leftovers of authentic human chaos in its nooks, like any rigid, totalitarian, expansionist, and monopolistic system has. Well, bugs are not a Microsoft monopoly, to be honest.

In general, the history of arts can be interpreted as a constant **warming** up to the temperature when the order dramatically drops: the melting point (see **Essay 11**).

What is **cold** and what is **hot**?

We use GREAT, BIG, SMALL, and TINY with a comparable range of nouns but there is always a potential number behind the adjectives of size. BIG success means that there is a large number of positive press, sales, attendance, profit, and small number of accidents and misfortunes of any kind. These qualities are measurable.

Speaking about emotion, desire, enthusiasm, interest, deal, stock, news, art, feeling, sex, color, debate, character, etc., we use the adjectives HOT and COLD in situations where no thermometer would work.

What number stands behind the metaphorical **heat** and **cold**?

For most of my life I believed that temperature was one of the cardinal properties of individual and social life and not just a lexical usage. My personal problem with temperature is that I am not an expert in physics and mathematics. As an excuse, I am looking at the temperature outside physics. A possible good side is that I can find common language with others like myself.

The last half of the twentieth century was spent by some scientists in search for a general theory of complex systems, usually called systems theory, a difficult and fuzzy topic that I would not touch here. The word "systemic," however, is a convenient identifier for the temperature I have in mind (although it has a particular meaning in medicine).

I believe that very complex systems, for example, humans, whether taken individually or as society, are not good objects for complete scientific description. The number of human situations and circumstances is enormous because of their combinatorial nature (see **Essay 12**). Yet there is a lot of built-in order in human behavior.

It may seem that the more order, the easier to describe a complex system, but the following example may perhaps illustrate the arising problem. Suppose, we have separate statistics of house purchases and marriages. We could calculate the probability of the combination of marriage and house purchase by multiplying the probabilities of both. The trouble is that this can be done only for independent events. To find out whether they

are independent or not, we have to compare three probabilities: two separate and one combined, which would make our original intent senseless.

This is why we read fiction, memoirs, and biographies: human life is described in them, presumably, as it is, although with most minute detail omitted. True, it can be very far from reality. Nevertheless we can clearly see typical human collisions even in science fiction.

I believe that analogies and metaphors can help understand complex systems. They are major tools of literature and I see no reason why they should be banned from use along with standard scientific approach to aspects, mechanisms, and patterns of human existence. Temperature is among them.

We enter a cold room and turn on the heater. The room thermometer shows the rising temperature because the molecules of air beat against its surface and transfer part of their energy to the liquid in the bulb. The liquid expands and its level in the capillary tube changes. This goes on until the thermometer receives as much energy from molecules as it gives it back, i.e., until equilibrium is reached. The nature of temperature is, therefore, energy. Temperature can be measured in units of energy. Since the mass of molecules does not change, their energy depends only on their speed. The faster they move, the more often they bump into the thermometer and each other.

I do not know what energy is and I am sure nobody can give a universal definition. It is so fundamental that cannot be defined through other things. On the contrary, we can define a lot of properties through energy. We know that energy never disappears and never comes out of nothing. We can measure its change. We can separate the change of energy into two components: change of order and change of chaos.

I start here with understanding temperature as a measure of average energy of chaotic events in the system. Thus presented, temperature loses all its specific physical flare except for the word “energy.” Instead of energy we can use the word "effect." For example, the temperature of the religious, political, environmental, feminist, anti-war, or any other movement can be measured by the frequency of demonstrations multiplied by their intensity and degree of violence. The temperature of the Middle Eastern region is the frequency of conflicts multiplied by their gravity. The temperature of an area of scientific research is measured by the frequency of publications multiplied by their novelty.

As individuals, we measure the temperature by the information that bombards the bulb of our brain. Unlike thermometer, our brain is what is called an open system: we can lose part or all information next day or even next minute. For the people in the Middle East, however, the input can exceed the loss, and the overheated brain turns to action.

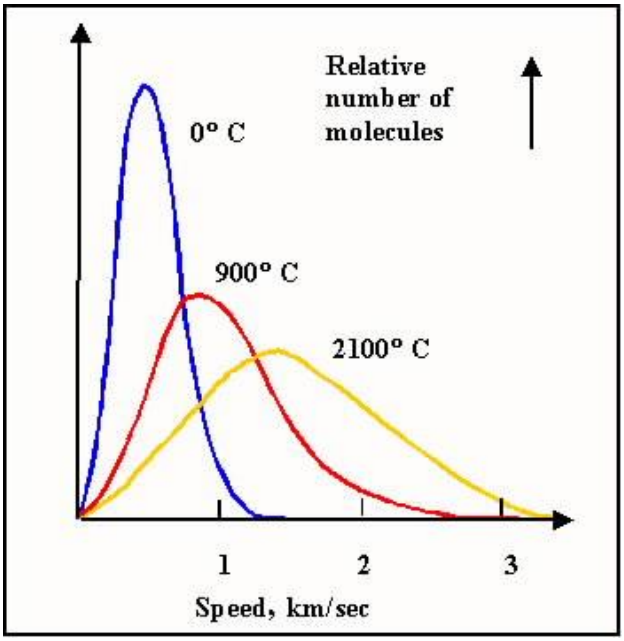
The bulb of the Congress, bombarded by demonstrations and lobbyists, finally reaches the legislative point of no return. A hot research area, on the contrary, may lose steam because the nature finally has little to demonstrate.

The temperature of love may manifest in the number of gifts and their value. It can be also read from the number of the escapades of the lovers and their eccentricity. Or, if you wish, from the frequency of letters and their length. In a hypothetic case that the number and length is pre-arranged, the temperature is the *rubato* of the correspondence: the chaotic variations of the order.

When temperature reaches a certain level, a significant change becomes possible. At a low temperature, the pace of change is slow.

With humans, everything is vague, ill-defined, and fuzzy, but this is why for anything BIG we need intelligence, hard work, and luck in this life. It takes energy to order chaos.

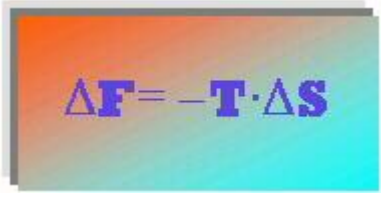
With molecules, everything is simple.



The **Figure** on the right illustrates what happens with molecules of gas when temperature changes from 0ºC to 900ºC to 2100ºC : the higher the temperature, the higher the spread of the distribution of energies of individual molecules, the larger the distance between the slow and fast molecules.

We cannot apply observations of molecules to people because life and society are open systems far from equilibrium. We can only draw metaphorical parallels. When it is hot, more of population gets to the extremes, so to speak. The population builds up an army of high energy individuals capable to change the system. When it is cold, the society consists mostly of the middle range units, which was, probably, the idea of egalitarian socialism.

It is still a part of American paradigm that the large middle class stabilizes society. I really don't know whether this is true and what stable society means. Low temperature is what stabilizes anything. Anything stable is cold.



This is how I would describe the temperature of a complex dynamic system in metaphoric (and not scientific) language: it is the range of spontaneity of events. A zero variability means zero temperature. Temperature is not a measure of order or disorder in the system but the measure of the effort needed to achieve an increase of order. At low temperature, little energy may be needed to maintain order, and at a high temperature,

same energy can create less order. In statistics, the spread of distribution is measured by variance and standard deviation, but I would like to keep the distance of a metaphor.

The words **temperature, tempo,** and Bach's well-**tempered** come from the same Latin root meaning the measure of proportion or doing the right thing at the right season. Temperature is the measure of doing the wrong thing at the wrong season, but only if you know what is right.

The power of analogy lies in both similarity it reflects and the difference it is aware of. The difference between society and gas is fundamental, but to explain it would take a lot of dry science. Anyway, the parallel between the physical temperature and the social temperature that I am drawing is limited. The reason for this is not an absence of general theory of abstract temperature —statistical mechanics is such theory—but the difficulty of defining real live models:

because of their complexity
because of incompleteness of our knowledge about them,
and, paradoxically,
because they are insufficiently chaotic.

I wish to stay at the level of metaphor which, unlike analogy, does not even assume any difference. It is simply a link, like in hypertext, and the link may be flawed, irrelevant, or non-existent. Why metaphor works is a separate topic (see **Essay 10**).

We can part with the household thermometer here. We can monitor the temperature in the Middle East with the clock or calendar, recording the number of reports in the unit of time. The only condition of measuring temperature with the clock is that events are not completely predictable.

There is no temperature without chaos. If the US Congress convenes according to the schedule, it does not matter what the schedule is. But any extraordinary session may mean heat.

Our life is highly ordered in time. Everything is scheduled and organized. We expect a certain predictability of life, without which no happiness is possible.

Is there any chaos in sunrise and sunset? No, the solar system is very cold on the human time scale and rarely disturbed. But the global weather is heating up, judging by the rising **frequency and extent** of catastrophic damage. The human activity is blamed but I have never seen any estimate of the price of scaling it down and paying for the global systemic air-conditioner.

Regular, expected, and repeated events have their share of chaos, too. It is difficult to evaluate the temperature of major airlines. The delays have become so predictable that we may see it as cool. The TV schedule is disregarded during major sports events, which is predictable and means no warming. We adapt to the systemic temperature as we adapt

to atmospheric one. But it tells us something about the price of order during the warm-up: it is beyond anybody's means.

Western art, apparently, has melted down in the twentieth century. It does not point to any catastrophe because of the memory. The entire history of art is preserved in museums and libraries, and performance art flourishes, but the liquid postmodern culture means that in the ocean of supply one can attract attention only by making big waves and loud screams.

In a solid, cold authoritarian society, like in an ice cube, an individual could establish direct contact only with a narrow circle of other people. In the modern warm and liquid society, like in a spoonful of water, one can, theoretically, bump into anybody. The Internet is regarded as a universal solvent. The same theory, however, tells us that everybody is lost in a global crowd, unless one has enough energy to freeze the liquid around and to build an island with a lighthouse, a bullhorn, and a big paddle to make waves.

In the systemic global warming, the tribal cultures of the tropics offer cool shade and anything solid, except human nature, is made of ice.

NOTES

1. The so-called zeroth law of thermodynamics does not define temperature but provides a relation for ordering it. This essay avoids the problem of a contact between different systems and considers only the change of temperature in a single system over time. The problem of interaction could be a topic for another essay. Sufficient to say that the art of an epoch tends to come to an equilibrium with its larger environment.

2. "Plato teaches us that, in order to take the spiritual temperature of an individual or society, one must 'mark the music'." Allan Bloom, *The Closing of the American Mind*, 1987. New York: Simon and Schuster, p. 72. Is the rock music hot or cold? I believe it is cold. Bloom's description of American students, whether correct or not, is chilling.

2001

3. (2016) Energy is what does not change when something changes in a closed system. But closed systems do not exist in nature.

4. (2016). Presidential Primaries of Election 2016 have the widest range of last remaining candidates that I remember: from leftist dreamer Bernie Sanders to opportunistic demagogue Donald Trump, from urbane cagy Hillary Clinton to grim acrimonious Ted Cruz. The American Society is clearly overheated.

Essay 15. On *menage a trois* in the Stone Age

[cybernetics, silicon, Alan Turing, embryology, mesoderm, ectoderm, Norbert Wiener, control, email filter, autonomy, Thomas Mann, Bill Joy]

I made a noteworthy discovery in the essay by Bill Joy *Why the Future Doesn't Need Us* : the words **cybernetics** and **Norbert Wiener** could not be found there by the FIND function of my MS Word. Cybernetics has been coming to a postmodern steady state of flow where newer information and ideas are flushing out the older ones, very often the same but forgotten, reinvented, and recombined. The time of my youth was millennia ago and the fifty year old cybernetics of its founders became a subject for historians, like alchemy.

I am a chemist but I have been thinking about cybernetics and computers for almost half a century.

Around 1956, after the end of the Stalin era, the "bourgeois pseudo-science of cybernetics" was exonerated, its sins absolved, and it was allowed to be studied in Russia. I was among the listeners to the very first lectures on cybernetics in my native city of Kharkov. The brilliant lecturer, Yuri Sokolovsky, was a professor of the local military academy.

Soon the major books of the founders of cybernetics were published in Russia. As a chemistry student, I attended the Sokolovsky seminar at my Technical University and made several presentations myself, including the design for a reading machine and the mechanism of nervous impulse.

Since then, I have been watching the developments in the area. I had my own ideas of a universal thinking machine based on the scale of sets, did some modest programming, but saw a computer for the first time only in America. Under the guidance and with generous help of Ulf Grenander, I got some working experience with MATLAB.

Today cybernetics for most people means computers but in the beginning it meant more, and it still means for some even more than in the beginning, see Principia Cybernetica site, where cybernetics is regarded as an aspect of general systems theory. The terminology has not yet been established but I would prefer the science of complexity as the name for the entire area. The reason why cybernetics is associated with computers is probably that nothing complex (and often nothing at all) can be done today without

computers. It seems that the initial meaning of cybernetics has been lost, which is quite natural, but it was definitely not just about computers.

As far as definitions are concerned, Norbert Wiener defined cybernetics as "the science of communication and control in the animal and the machine". One of the recent definitions is only slightly expanded: "the science of communication and control in the animal, machine, society and in individual human beings." The machine seems to be out of rank here, but it fits as an extension of humans. I would specify even further: "humans and machines made in their image," i.e., performing their function of communication and control.

Computer chips are made of silicon, a chemical element that constitutes about 28% of the lithosphere, the external solid layer of the earth. In rocks and sand only oxygen is more abundant (47%) than silicon.

Our computers, so to speak, still exist in their Stone Age. They are rock-solid tools made of stone and for this reason they are sturdy and reliable hardware. They are in the very beginning of their evolution and, since we are inseparable from them, they drag us partly back to our own Stone Age.

In 1936 Alan Turing invented an imaginary (virtual) computer known as the Universal Turing Machine. Remarkably, any digital computer **that we know** today is still equivalent to it in the sense that both can perform the same task. Even more remarkably—and that was the core of Turing's argument—the Turing Machine is roughly equivalent to a human with a lot of paper, pencil, eraser, instructions (program), and enough time to spend. The necessary condition of the equivalence is that the human who impersonates the machine should neither think, nor make errors, nor try to do something on his own, but just follow, with idiotic obstinacy, the rules and instructions. The rules are simple, but the instructions can be very complex.

On such harsh conditions, a thinking computer is contradiction in terms. In order to compute one does not need to think. Thinking (although not much sophisticated, either) is needed for programming, i.e., writing instructions to perform a known procedure. The highest IQ is still required for inventing a new procedure, setting a new goal, and formulating the purpose of a new program, often in plain language, i.e., doing something for which instructions do not exist. It is hard to require a sincere and spontaneous human initiative from a machine. Unless it is so programmed, why should machine care about humans if it has plenty on its own machine agenda?

The Turing Machine does not care about time and speed of its work and it makes no sense to employ it. It is a real Stone Age technology. We all have developed from the Stone Age, however, like our bodies developed from a single cell very much like a primitive bacteria, and our roots deserve respect. The Stone Age people had all their magnificent future (i.e., our times, the best of all) ahead and the Turing Machine, too, heralded a new era of machine progress toward brilliance.

Computer **as we know it** is a non-thinking automaton with inputs, outputs, some modest hardware (the bulky desktop PC is almost empty), and the program supplied by thinking humans.

Thinking: what a slippery ground! There are different things, all called thinking.

I have witnessed the waves of hope and disappointment in artificial intelligence, fragmentation of the debates on the nature of mind, the escape from general problems to highly specialized arcane micro-problems, and, most recently, its impressive commercialization. I believe that there had been absolutely no reason to expect computer (as we know it) to be as intelligent as humans because, according to Turing (more exactly, the Church-Turing thesis; [the link is very much worth reading]), computer could only imitate a very dumb human and *vice versa*.

So much information has been spewed away on computer printers about computers that whatever I said could be either technical or trivial. It seems, however, that we have not yet exhausted the topic and still do not share a common understanding of the computer revolution.

Concluding Chapter X of his *The Human Use of Human Beings* and recalling Samuel Butler (see **Essay 6**), Norbert Wiener noted that "...machine's danger to society is not from the machine itself but from what man makes of it ..." It was written long before PC and mass computerization.

I have some doubts about that. Today I am less seriously taking warnings about "danger to society," even coming from Norbert Wiener because it has always been the favorite tool of all ultra-conservatives, fundamentalists, and dictators, as well as terrorists. Society survives any change, updating its spreadsheet of gain and loss, and evolution cannot be stopped. The danger threatens only the society **as we know it**. The question is what kind of change can we see today and expect tomorrow?

If I say that I believe that nothing can be compared with computer in its effect on human evolution, this my statement will be a good example of cyber-banality. I see, however, a narrow crack to squeeze in something, probably, not patently trite.

The reason for the special role of computers, in my opinion, is not the novelty of computers and the swiftness of their invasive impact but their hidden antiquity reflected in the term cybernetics. I see their evolutionary roots going far back into pre-history. The desktops and laptops may be new but what they do is something deeply rooted in human nature. Well, moving in space is even more deeply rooted in our animal nature. Isn't computer just a better way to do mental work, as automobile is a better way to move around at high speed?

An analogy comes to my mind from embryology. When the single cell of the fertilized egg starts division, hundreds of the multiplying cells first stay together in a lump similar to mulberry (it is called **morula**, from the Latin for mulberry) and later arrange in a

hollow sphere or disk called blastula. The sphere caves in, like a punched tennis ball, and makes a double-walled cup, gastrula. Between the two layers, ectoderm (outer) and endoderm (inner) , a third layer, called mesoderm, develops.

In human embryo, the layers have the following future:

> **Endoderm** will form the lining of lungs, tongue, tonsils, urethra and associated glands, bladder and digestive tract.
>
> **Mesoderm** will form the muscles, bones, lymphatic tissue, spleen, blood cells, heart, lungs, and reproductive and excretory systems.
>
> **Ectoderm** will form the skin, nails, hair, lens of eye, lining of the internal and external ear, nose, sinuses, mouth, anus, tooth enamel, pituitary gland, mammary glands, and all parts of the nervous system. The future nervous system soon differentiates from the ectoderm as neural tube.

The evolutionary meaning of this analogy is that the complexity of an organism or any complex system develops by unfolding a simple starting germ, so that the final abundance of components can be traced back to the simple beginning.

Simple initial components differentiate further by splitting, adding, inserting, erasing, and moving—functions strikingly similar to that of the word processor. The embryo develops like a novel from its sketch, and to the novel we go.

Thomas Mann (1875-1955) was one of the most complex and intellectually refined writers of the twentieth century. I have not studied his life and creative method, but it seems to me that some of his images come from abstract science. Thus, in *The Confessions of Felix Krull, Confidence Man* (1954) he casually echoes the Gottfried Wilhelm Leibniz's concept of time. The time of writing his monumental novel *Joseph and his Brothers* (1934-1944) followed and partly coincided with fast developments in mathematical logic and I can hear some distant repercussions in the book.

Thomas Mann takes the ready germ of the story of Joseph from *Genesis* and unfolds it into a long multi-volume novel of somewhat overbearing complexity by essentially inserting imaginary episodes and characters between the expanded traditional ones, similarly to embryogenesis, so that the parts of the novel can be traced back to the original account.

Thus, a long, intricate, and loquacious part develops from the following terse account :

> Then there passed by Midianites merchantmen: and they drew and lifted up Joseph out of the pit, and sold Joseph to the Ismaelites for twenty pieces of silver: and they brought Joseph into Egypt. (*Genesis*, 37: 28)

For some reason which I do not understand, Thomas Mann calls the merchant owner of Joseph Ismaelite and Midianite intermittently, but never by his name. The merchant soon learns the true value of his investment in Joseph. This is what the merchant says, looking at the register of his goods written by Joseph:

> It is a pleasure to see one's own so cleanly set down and the various items listed in order. The goods themselves are greasy or they are sticky with gum; the merchant does not willingly soil his hands, he deals with them as they are written. They are there, but they are also here; clean, not stinking, easy to see. A list like this is like the Ka or the spiritual body of things, alongside the real.

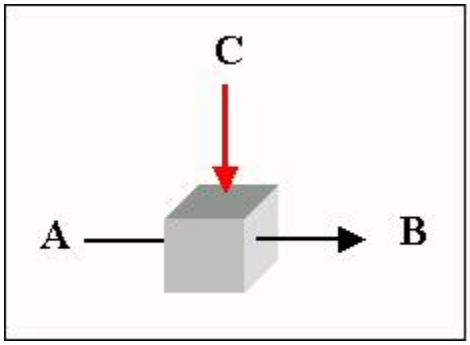
Business, which is the life of Things, is impossible to run without the symbolic representation of "real" Things not necessarily existent at the moment: they could have existed in the past or would exist in the future, like issues of debt, payment, and interest. Same with design and construction: the pyramid had existed in the mind of the builder before it was actually built.

The backtracking of computer to the abacus is shallow if taken literally: there is nothing in the computer from beads and wires. But computer definitely originates from the procedure of counting, and this is why abacus is listed as its ancestor. Counting, in turn, is part of trade and from this ancient aspect of human existence computing germinates. Control, however, comes from even much older one, shared by humans with other social animals ruled by the alpha male, not to mention the central nervous system.

Operations with symbols require incomparably less energy than operations with matter. Control, the central subject of cybernetics, has always been an art of producing big consequences by small causes and giving orders in a quiet voice, even whisper or gesture—in business, politics, or on the battlefield.

Inanimate physical nature has no idea what symbol is and, for that matter, has no ideas at all. It deals with direct interactions, mostly between two objects. Nature is honest and straightforward, or, as Albert Einstein put it, God is subtle but not malicious. If so, life with its chase, fight, mating, hiding, bluff, and mimicry is godless.

Cybernetics deals with a triplet: input, output, and control. Its elementary structure is T-shaped: information flowing from A to B (or back) is controlled (modified, processed, modulated, switched) by C. This *ménage à trois* seems to me the central idea of cybernetics, and control can be both subtle and malicious.



In the novel about Joseph, in the chapter compellingly entitled *Threefold Exchange*, Thomas Mann describes a subtle and malicious trick that Joseph's enemy Dudu plays on both

Joseph and Mut-em-enet, Potiphar's wife, in order to bring them together for the sake of Joseph's peril. Iago achieves a similar effect with Othello and Desdemona by splitting them apart. Both Dudu and Iago control the interaction between the couples.

A chemist controls the honest interaction between the components by varying temperature and catalyst. A villain controls the interaction by disinformation.

It seems like a rare coincidence that the same term cybernetics, with essentially the same meaning, was independently invented in 1838 by André Marie Ampère and in 1948 by Norbert Wiener. To me it confirms that cybernetics is a very ancient subject comprising various situations with the external interference in information processing: government, steering, driving, politics, media, management, and communication, all of them including manipulation of the "natural" or "direct" course of things. Cybernetics, in other words, is about the non-physical world. Or, if you wish, it is an extra chapter of physics which is necessary for applying physics to life, intelligence, and society—systems of high complexity irreducible to equations.

The brain, helmsman, driver, and governor—functions that contribute to the semantics of the term cybernetics Χυβερνητης (kybernetes: navigator, steersman, governor)—cannot leave the body, ship, vehicle, and nation (actually, Wiener meant the flyball governor of the steam engine) to negotiate with external forces on their own. They try to outsmart the laws of physical, biological, and human nature in order to survive and win. This is a truly primary layer of the embryo of civilization. I would not characterize it as mesoderm, however. The brain and nervous system grow between the organism and the world, from the ectoderm, i.e., from the interface between the organism and the world.

The brain is the controlling C of the figure. It mediates the inputs A and outputs B in a "threefold exchange." It warps the direct and honest interaction between the world and the organism, which would, most probably, kill the organism. It makes behavior deceitful and cunning but less deadly. Brain arbitrates a deal between the individual and environment, spreading the time scale of the deal beyond the present moment. The flyball governor of the steam engine maintains the speed constant by manipulating the steam pressure. The governor of the state navigates through the variations of the political pressure.

In the embryological key, people started doing some computing in the form of transportation.

> Kill a deer in the woods and bring it home for cooking.
> Find a stone at a river bank, bring it to the cave, and make a mallet.
> Load the sheaves on the ox cart and transport it to the threshing floor.
> Bring the grapes to the winery.
> Put an icebox into the car trunk and drive to the picnic place.
> Check in a suitcase in New York and get it back in Paris.

By computing here I mean the initially physical but then also symbolic transportation of a thing from one place to another. Trade and transportation needed accounting. For each item there was a number, the *Ka* of the Thing, in Egyptian terminology, that was also moving from one place in the register to another, but remained in the book like the *Ka* in the tomb.

> **NOTE**. *Ka* was different from *Ba*, soul, which could freely roam the earth. The subject, however, is much more complex and my use of the terms is rather arbitrary.

The Turing Machine can be implemented by a large warehouse where computation is done by placing (corresponds to writing) or removing (corresponds to erasing) copies of two objects (corresponding to 0 and 1) , on and from the shelving, according to a book of instructions.

Transportation of inanimate things was the very beginning of computation. Unlike computer programming, transportation has to deal with:

large objects
significant energy
significant distances
significant time.

The use of the abacus cut down on the extent of all four components and reduced handling the Ka of the objects to moving the beads back and forth.

Like symbols in the computers made of stone, or like the beads in the abacus, the Things cannot spontaneously change their place, appear out of nothing or disappear, unless they are alive.

Computation deals with two things: 0 and 1. While the airplane transports passengers and their bags, burning a lot of fuel, the airline computer transports zeros and ones (the stuff of their Ka) from one place to another within itself and with a minuscule energy spent for each transportation. The computing in an airline computer has the actual transportation as result. Now a suitcase has a double existence: as suitcase and as an entry in a computer, like the goods of the Midianite merchant in Joseph's inventory, and so are the jet liner, the passenger, and even France.

What is the difference, then, between Joseph's calculations, abacus, modern card size calculator, and computer? Why is it not enough to see computers as mere tools, definitely less harmful than cars and airplanes? Why not to regard computers as just extensions of our brain, like pliers, hammer, and screwdriver are extensions of our hands?

The physical interactions are direct and "honest" in the Einstein's sense. In the physical contact between the tool and the object, say, hammer (A) and nail (B), there is no C in the cybernetic triplet.

This is still true for the work of a programmer: there is nothing between the young computer geek and the computer. This is why programming can became an obsession, like gambling, and I would like to make a short digression on that.

> It is not too often that young people are drawn to science and technology. The early interest in complex subjects is not typical, while interest in sports and entertainment is.
>
> When a scientist starts an experiment, a certain time separates its beginning and end. A chemical experiment may take an hour or a day. A hunter for rare particles can spend months, a biologist may need weeks and sometimes years to see the results.
>
> While the experiment is running, the scientist can talk to a colleague, go home or to a movie, read a book, have a date, or just think about life's persistent questions. Science does not give an instant result.
>
> In most mundane human occupations work requires physical effort and lasts a shift. The result of work comes as paycheck. The final social result of the work may be unknown because things are done by many people. Life provides few instant gratifications.
>
> Programming and gambling give you an almost instant result. You change a block in a program, add something, try a different approach, and get the output very shortly, with the exception of long computations that can last many hours—usually simulating something naturally very fast, like atomic and molecular processes, and even thinking. Whatever you do, your physical action consists of operating the mouse and the keyboard and requires very little energy.
>
> The result of the action is clear: to score in a computer game or to get the desired output. The nature and its solemn laws seem to lose their grip on you. The person at the computer is in the ultimate control of the situation. Working with a computer, like baseball, has a great appeal in the individualistic culture because nothing can wedge between the input and output. It is the closest thing to game.
>
> Sadly, crime is also in the neighborhood of gambling.

Programming and games, however, are not the only way to spend time with computer.

In the social system (I include technology and environment in social system), the computers become a new organ or, rather, tissue, omnipresent like blood vessels and muscles in a living organism. Unlike telephone that does not process information, computers wedge in between C, A, and B and create an additional interface: human-human, Thing-Thing, and human-Thing, so that the direct interaction becomes less typical than the indirect one.

The world has to filter through computers before it reaches a mind, natural or artificial, and the mind is separated from the outputs in the same way.

I am sure that a determined researcher can show how word processor changes the style of literature as compared with the quill and the typewriter.

The simplest and highly typical example of the new situation is the email filter that we use to guard off the spam. There are filters for much more sophisticated control, for example, SuperScout , with artificial intelligence capabilities that promise to prevent sexual harassment, protect company image, and much more. The document processing software, such as Autonomy , takes care of internal information. It promises to understand emails, voice, text, documents, web pages, people ("profiling users basing on the ideas in the text they read or write") and, in general, as its motto says, "read between the lines". See also Cycorp.

Autonomy Corporation, as I can conclude from advertisement, makes a probabilistic software that is never error-free and it honestly states so. I somewhat misanthropically believe that it will compete very well with average employee performing the same functions, especially, in the government. Nevertheless, it is yet another step in the growing development of "interfacial society" that started with multiple choice answering systems at banks, telephone and other companies, and the government, mostly very useful and efficient, and only occasionally frustrating.

With software like Autonomy, computers can soon become not only the generators of mammoth government documents like the national budget or an independent counsel report, but also their sole in-full readers.

The Smart Tags of Windows XP that give filtered information on words in the text is the most recent example of the control over control and the oncoming takeover of control by computers, in this case, in the name of the Microsoft's well-being.

This is the normal process of evolution from simple forms toward complexity that we can observe on biological evolution (recapitulated on high speed in embryogenesis), history, and creative writing. How long can complexification last and whether it can be reversed is an intriguing question. but not for this Essay. I believe that the substitution of answering system for a human bank clerk is already such a simplification. This, however, calls for the specter of Bill Joy's *Why the Future Doesn't Need Us* . But first, multiculturalism has to embrace the culture of Things and autonomous cybernetic systems, which may take longer than the lifespan of multiculturalism.

Here we come to the core of the new situation.

The tools, from the screwdriver to the railway train, are Things. Computer is a Thing, too, but not just a Thing. The Things attach the humans to the cycles of their business metabolism, and so does computer as hardware. Software as Thing is a different matter.

The new evolutionary turn brought about by computers is that computers make commercialization (i.e. turning into Thing for sale) of control not simply possible (as happens with humans in case of corrupt officials) but typical and independent of the intent of human users. Computers control the communication and the control itself not because people use them in an inappropriate or dangerous, as Norbert Wiener anticipated, way but because they are mass-made and universally spread as an interface, a new social tissue, and because they are themselves Things, i.e., a form of life (life form).

Operons, i.e., the three-point units of control (from switches to brains), form a triumvirate with gene and meme (see **Essay 6**) in the super-system developing right before our eyes where genes, memes, and operons are Things for sale. Things for sale propagate their blueprint memes like oak propagates its genes through the acorns.

If computer were simply a counting, computing device, a super-abacus, there would be as little problem with the new tool as with a better mousetrap. A new **tool** cannot radically change our lives. But a new organ, a whole new biochemistry and physiology, a new source of energy, levitation, teleportation, and a new principle of social organization would mean a radical evolutionary step.

Computer is not just a computing tool but a cybernetic, i.e., controlling device with its software made outside, in the business cycle. It is a kind of a social formation, function, organ, or tissue, in short, subsystem. This double identity of the computer, in my opinion, comes from the evolutionary difference between the functions of computation and control.

Computer that computes a function is a computing device. Computer that decides the fate of an email, employee, or idea is a control device that deeply interferes with the evolutionary fate of components of a complex system. We cannot blame humans for using computers anymore because "the railways ride the people." (see **Essay 6**).

Rights come with responsibilities. To make a piece of software a Thing for sale was a sharp revolutionary rather than evolutionary turn toward the society without responsibilities and we are going to face the consequences in the sphere of rights.

It is most extraordinary that the new turn has been accomplished with the computers of the Stone Age.

Our brain cells consist mostly of water with addition of fat and proteins. It remains to be seen whether we need to manufacture chips from mayonnaise in order to make it to the

next stage where computation is achieved by trial and error, learning, invention, and inspiration.

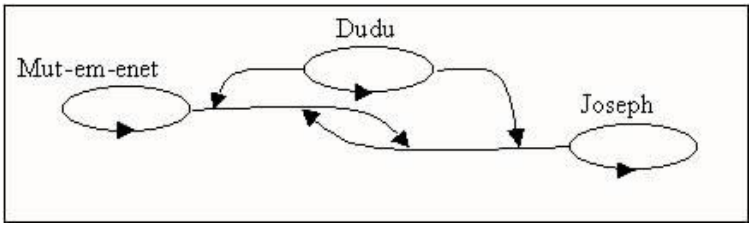
It is easy to imagine a computer **that we do not yet know**: It not only makes errors—this is the easiest part of being human—but tries various approaches, fails, wins, disobeys instructions, changes them, and evolves. In other words, it is an equivalent of a human of high IQ and independent character.

As Thomas Mann noted, "Part of the game we play with life consists in relations of human beings one to another." For better or worse, no more: it is going to be *ménage à trois.*

GRAPHIC APPENDIX

Ka  Ba 

Part of the Principia Cybernetica page header.



Dudu manipulates the relationship between Joseph and Potiphar's wife Mut-em-enet. Dudu is not a software company.

2001

P.S. (2016). Social media, for example, is no more a tool that we **hold** and fully control. It is a *ménage à trois* with Facebook or Google, or anybody who offers this Greek gift for our benefits. Apple swears it does not. But the Government knows better. I always prefer the Government to be the Third One under my bed. We can still control the Government, USA is not Russia, but we cannot control any company even when it calls itself public. Yet Government can. It is our true tool, at least in theory. In a split overheated society, voting for Sanders and Trump, however, we can only fight for it.

Essay 16. On Somebody Else

[liberalism. liberal democracy. Francis Fukuyama. superman. Hegel. Nietzsche. normal distribution. bell curve. dimensions of politics]

This essay was prompted by the following remark of Alan M. Dershowitz about the deterrent system of justice, i.e., based on the intimidation by the threat of excessive punishment:

> Experience teaches us that this kind of a system does not work effectively, since most potential criminals don't believe they will actually be caught and convicted.
> Alan M. Dershowitz, *The Genesis of Justice*, 2000. New York: Warner Books, p.255.

There was very little useful knowledge I could extract from my contacts with the inmates of Russian prisons and labor camps. It might have enriched me with understanding myself—a useless knowledge because I, like the proverbial leopard, could not change my spots anyway—but the fringe of humanity offered no new insight into its core. In contrast with the scientific experiment that brings the nature to the edge and watches it crack up under pressure, human nature provides us only with statistical expectations in place of intuitive ones.

Among the meager humanitarian baggage I carried out of the world of barbed wire, one observation was very close to the above quotation. I only have a doubt about the word potential . Potential means not actual, and many people who have not yet planned and committed crime are not aware that they are capable of it. The situation recalls the remark of Robert Jordan in *For Whom the Bell Tolls* by Ernest Hemingway. When asked if there were fascists in America, he said that "there are, but they are not aware of that."

The second and last observation was equally trivial: the detention does not make anybody better. And that was all I learned. Alan Dershowitz is absolutely right.

Professional criminals I met were anxious to get back to their trade and they were sure that next time they would never make a mistake. Somebody else would be caught but not they.

The attitude is not unique to the burglars and thieves. Everybody drives, flies, goes out, strolls sidewalks, and enjoys life because he or she believes that somebody else will get into a traffic accident, airplane crash, or will get food poisoning, stray bullet, or cancer. Statistical data support this belief of the optimist, but, for the pessimist, probability is the welcoming portal of misfortune. The asymmetry of human nature makes us trust the good luck more than the bad one.

I am not planning a crime and neither have I committed one (never believe such a statement), but I have something to confess.

I am an unwilling liberal: unwilling because I don't like the reasons why I am liberal.

It is difficult to start a confession, but then it may be hard to stop.

I treasure personal freedom. I don't like restrictions. As somebody who spent most of his active life in a totalitarian society, I enjoy American freedom.

I am not in opposition to the existing society. I don't know what a good or better social order is. A social flaw, as I see it, is nothing but my personal attitude to it.

I would probably be more aggressive and intolerant if I lived an active life, but my activity is over. Because of that, I have an advantage of impartiality.

I am not completely impartial, however, because I am a liberal. This is a statement, a point of view, an instinct, and a bias. I have a prejudice of being liberal. I am not quite tolerant of non-liberals. I wish I could be more tolerant. I am more individualist than altruist. I wish I could be more altruistic. I loathe anarchy but I mistrust organizations. I am not sure what democracy is and I believe that any Constitution is conservative by default. I think that equality is a kind of *perpetuum mobile*, the impossible eternal motion. I believe that cooperation is profitable for both sides, and we do not have to regard it as a moral value. I believe that the highest values of life are health, freedom (see **Essay 3, On Free Hay Trade**), and peace of mind, but I would never impose my somewhat Oriental values on the rest of the world. I don't believe either happiness or virtue to be the highest value. I believe that learning, understanding, and dark chocolate are among highest bitter-sweet pleasures of life. I believe love is made of all three. My attitude to the world is defensive. I do not believe that life is an absolute, overwhelming and overriding value, and I believe that there is no single highest and overriding value.

One of my deepest convictions is that any abstract idea that contradicts basic human needs is a definitely bad abstract idea. To be logical, it means that "bad" is not bad idea *per se* but only its extreme and unopposed advance. It also means that the basic needs are those recognized by an absolute majority of people, and the opinion of the absolute majority of people is something I cannot rely on.

But that was not my confession, just a warm-up.

I confess that I am a liberal because I believe, like a thief, that somebody will take the risks of liberalism, while I will definitely enjoy liberal democracy or suffer the consequences of anti-liberalism.

There is neither a universally accepted understanding of what liberalism is, nor a unity among people regarding themselves or others liberals, nor any chance for anybody to

read all the uncountable special literature on the subject which comprises all of the humanities.

Steve Kangas maintains a bird's eye view site on liberalism. The site works as a psychoanalyst's session: it makes the reader discover, to his or her surprise, something deeply hidden in the mind. Or, if you wish, it is a lie detector test.

For example, I was surprised to find out that I, considering myself a liberal, tend to disagree with at least five out of eight characteristics of liberalism as opposed to conservatism:

Liberals	**Conservatives**
Collectivism	Individualism
Change	Tradition
Science	Religion
Inclusiveness	Exclusiveness
Democracy	Constitutionalism
Equality	Merit
Public Sector	Private Sector
Pacifism	Armed Deterrence

Looking for various definitions, I did not find myself at odds with definitions of liberalism associating it with "individual freedom," (definition 1) such qualities as "intellectually independent, broad-minded, magnanimous, frank, open, and genial" (definition 2) , although I cannot accept that:

> A fundamental principle of Liberalism is the proposition: "It is contrary to the natural, innate, and inalienable right and liberty and dignity of man, to subject himself to an authority, the root, rule, measure, and sanction of which is not in himself" (definition 2).

I believe this sounds more like the credo of anarchism.

That "Liberals want to change things to increase personal freedom and tolerance, and are willing to empower government to the extent necessary to achieve those ends" (definition 3) seems to directly contradict definition 2: how can one demand from anybody to succumb to the will of the government if it is contrary to one's dignity?

Finally, definition 4 has nothing to do at all with liberalism as I understand it, which may mean that I don't understand it at all:

> 1: a political orientation that favors progress and reform
> 2: an economic theory advocating free competition and a self-regulating market and the gold standard.

I don't know about the gold standard, but a self-regulating market advocates anything but equality and any right-wing conservative is for reforms.

I am not even sure what the opposite of liberalism is. One can conservatively believe in old liberal values and resist the postmodern and frivolous ones.

Like many readers, I was greatly impressed, without being convinced, by Francis Fukuyama's *The End of History and the Last Man.* I see this book as a concise critical introduction into liberalism. It is complemented with the author's position that summarizes a host of accumulated over decades hints, forebodings, views, and ideas, partly old and fossilized, and partly new and shyly fluttering in the air. It seems, however, that the reaction of academic reviewers was rather negative or condescending, but it was not an academic book but an extended question. An answer can be wrong but a question is always right, whatever we say about "wrong question."

The title of the Fukuyama's book starts with an allusion to G. W. F. Hegel who, having witnessed the French Revolution, saw the final phase of world history in the reign of law and personal freedom, which for him was freedom of Spirit.

It is worth mentioning that Hegel saw the beneficial end of history in German monarchy, too, because:

> Yet with firmly established laws, and a settled organization of the State, what is left to the sole arbitrament of the monarch is, in points of substance, no great matter. It is certainly a very fortunate circumstance for a nation, when a sovereign of noble character falls to its lot; yet in a great state even this is of small moment, since its strength lies in the Reason incorporated in it.
> (Hegel: The Philosophy of History, pdf)

The second part of the title points to Nietzsche who in *Thus Spoke Zarathustra* wrote:

> There cometh the time of the most despicable man, who can no longer despise himself. Lo! I show you THE LAST MAN. "What is love? What is creation? What is longing? What is a star?"--so asketh the last man and blinketh. The earth hath then become small, and on it there hoppeth the last man who maketh everything small.

History formally linked Hegel (through his distant student Karl Marx) and Nietzsche to the roots of the self-destructive ideas of fascism and communism. The lives of Hegel (1770-1831), Marx (1818-1883), Nietzsche (1844-1900), Lenin (1870-1924), and Hitler (1889-1945) overlapped, covering a long historical period, like a growing cloud from which the thunderbolt of the World War II finally struck. Of course, to blame philosophers for that is like to blame Richard Wagner for the Holocaust. The French Revolution that inspired Hegel was gruesome enough.

In a very simplified form, Fukuyama's concept means that the liberal democracy, equalizing all individuals and groups, leads to either bleak purposeless existence of the

Nietzschean last men or to an advent of a new totalitarian strongman. Ideas do not die, but liberal democracy seems to be an idea loaded with a kind of self-destructive implementation and more appealing as an ideal than as a reality. In short, it is philosophically incorrect to be happy even if it is politically correct.

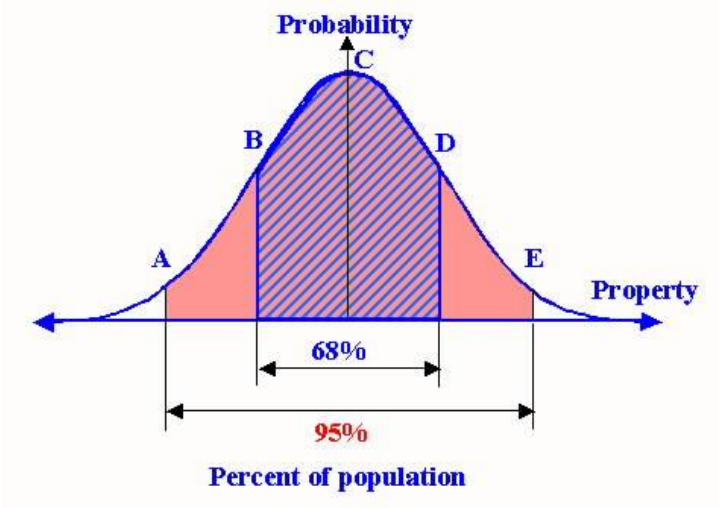
Strangely anticipating Nietzsche, Hegel wrote in *Philosophy of History* that "periods of happiness are blank pages" in the history of the world. Hitler and Stalin certainly left no paper wasted, but made their nations happy for a while. I suspect, however, that history hates void as much as physical nature does, and we need not be concerned about being bored by happiness.

By the very nature of my Essays I have to remain at the level of impressions and analogies, which means to be wired above the ground like Peter Pan over the theater stage. I cannot descend on the floor of research and analysis. I would only add that Fukuyama is not alone, although nobody has stated the problem so head-on, and with so much argumentation and refinement, although not without ambiguity.

Here is my personal view of liberalism, which may not be too original.

Most people in the world are not concerned with politics, philosophy, and art and live by basic human needs that include entertaining and pleasure together with needs of the body. They accept the existing order and mind their business. They have their radius of freedom. They are happy to be like everybody. They work, love, and live. Others—a minority—try to create something that would distinguish them from the rest and set apart from the average. But what is average and what does it mean to be set apart from it?

The following curve is known as the bell curve or **normal distribution curve** and although it is a mathematical object, it carries some political charge.



Its meaning is very simple. If the **property** is the height of a human, then most **probable** height of a randomly chosen person is close to the average represented by point C on the curve. The more the height differs from the average, the less probable it is. There are very

few very tall people and very few very short ones. Thus, 68 % of all people have heights between vertical lines B and D and 95% have heights between A and E. Separate measurements for men and women would give two different curves of similar shape but with different average. Similarly, the height curves for Thailand and Sweden will have different averages.

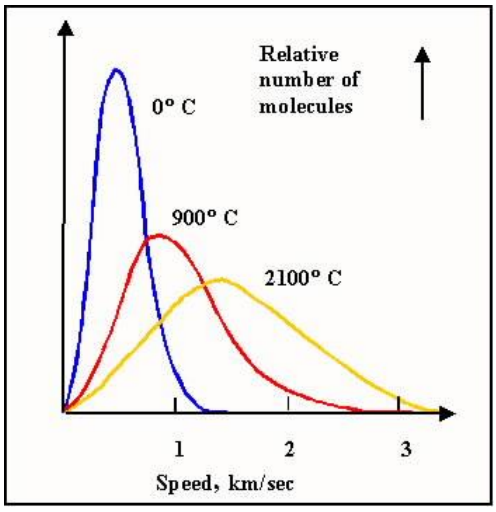
The normal distribution curve is symmetrical, which means that there must be an approximately equal number of deviations up and down from the average. In the normal distribution, the deviation of the value is, theoretically, infinite in both opposite directions, although large deviations are practically impossible.

There is a neat demo of the normal distribution and a lot of sites on the subject where one can find the reason for the mysterious numbers 68% and 95% , points B and D, and other things highly relevant for understanding the reality of everyday life and for many social and political issues.

The real probability distribution in nature and technology may not be completely normal if there are constraints on the measured property, i.e., somebody or something works on the system in order to make it less random. For example, the height of a free-growing apple tree distributes normally, but in the garden, under artificial selection, it can be skewed by cutting down all trees only below or only above a certain height. Systems with competition for a limited resource can also present a highly biased picture. Normal distribution is an evidence of the random nature of processes leading to a certain height as well as of sampling.

A highly ordered system has a very narrow probability distribution, with the majority of components very close to the average. A more chaotic system tends to have a flattened distribution, with outstretched wings.

In general, the shape of the probability distribution for a particular random system can vary but the main principle is that the larger the deviation from the average, the less probable it is. Thus formulated, it is simply common sense, like much of the science of probabilities.



The distribution of the **speed** of molecules (see **Essay 14, On Taking Temperature with a Clock** , from which the figure on the right is copied) is not normal. Still, the shape of the curve is close to the bell form, although stretched in one direction. This skewed bell shape is known as Maxwell-Boltzmann distribution and it depends on the temperature.

> **NOTE**: In **Essay 31, *On Poverty***, a bell shape deformed into a shark fin shape can be found.

Since **energy is proportional to the square of the speed**, the distribution of energies will look similar to the speed distribution.

There is a cardinal difference between height of humans and speed of molecules. While height is a permanent property of an individual adult, speed is a dynamic property. A molecule constantly changes its speed vector as result of collisions with other molecules. Human society combines static and dynamic properties as result of various kinds of exchange between its members, for example, exchange of wealth and opinion. This is why humans bear some "molecularity:" not because there are a lot of them and they are in motion—so is sand in the tide—but because they are involved in a constant interaction. This is what we call **dynamic system**.

The physical details about Maxwell-Boltzmann distribution are abundant on the Web, see a good analysis and simulator , with remarkable "big picture" generalizations somewhat relevant for the human "big picture" I am trying to imagine.

Human energy, determination, spirit, charisma, stamina, ambition, momentum, drive, creativity, intelligence, pride, and other dynamic properties vary from, theoretically, zero, to, theoretically, if not infinite then some potentially large value. Its limit is as unknown as any future sports record. If only we could measure ambition like we measure height! We still can do it without numbers, see **Essay 13, On Numbers**.

Since ancient times, philosophers and, later, social psychologists tried to define the evasive and multifaceted dynamic property that Plato called *thymos* but regarded it as a static component of the soul.

The following quotation from Francis Fukuyama's book gives not only a condensed explanation but also a sample of his style.

It was first described by Plato in the Republic, when he noted that there were three parts to the soul, a desiring part, a reasoning part, and a part that he called *thymos*, or "spiritedness." Much of human behavior can be explained as a combination of the first two parts, desire and reason: desire induces men to seek things outside themselves, while reason or calculation shows them the best way to get them. But in addition, human beings seek recognition of their own worth, or of the people, things, or principles that they invest with worth. The propensity to invest the self with a certain value, and to demand recognition for that value, is what in today's popular language we would call "self-esteem." The propensity to feel self-esteem arises out of the part of the soul called *thymos*. It is like an innate human sense of justice. People believe that they have a certain worth, and when other people treat them as though they are worth less than that, they experience the emotion of *anger*. Conversely, when people fail to live up to their own sense of worth, they feel *shame*, and when they are evaluated correctly in proportion to their worth, they feel *pride*. The desire for recognition, and the accompanying emotions

of anger, shame, and pride, are parts of the human personality critical to political life. According to Hegel, they are what drives the whole historical process.

The big picture is that any human ability, physical as well as intellectual and related to character, distributes over the population along some bell-like curve, varying from zero to yet unknown record limit. I believe, so does what Fukuyama calls, after Plato, *thymos*.

I would define "generalized thymos" as the will (desire, volition, activity, etc.) of an individual to deviate from the average. Plato believed it was the drive to recognition, Nietzsche saw it as power, Napoleon and Hitler saw it as conquest, Lenin and Stalin saw it as maximal political domination, but it does not really matter what they wanted. What matters is that they wanted it very much and not only wanted but acted toward achieving their goal. Ambition is, probably, the best modern approximation of the Greek thymos.

I would call it energy: the human drive to reach the extreme outward wing of the bell curve. We actually widely use the word creative energy in this sense. The recognition comes as a number: money, possessions, territory, sales, prize, romances, awards, publications, grants, references, media attention, biographies, etc., or simply being number one. It depends on the interaction with other people, like the energy of molecules.

Among people with high energy (Vilfredo Pareto's *elites*, see Note 1) we can find not only conquerors and emperors but also great philosophers, artists, scientists, inventors, builders, founders of institutions, national leaders who selflessly served the nation in times of a crisis, reformers, industrialists, philanthropists, leaders of social or ethnic movements, and others who were mostly but not always universally praised by the posterity. Plato, Hegel, and Nietzsche are in the same wing of the curve with Napoleon.

Instead of— or in addition to—enjoying whatever life brings, focusing on everyday problems, making day to day decisions, struggling for personal survival, limiting the sphere of personal interests by family, friends, and pets, pursuing pleasure, accepting the existing order or fighting for a comfortable personal place in it, "people of the wing" did what historically only a minority could do: they left the world changed not over millennia, as nature does, but, sometimes, overnight.

I do not see any reason either to scorn the common people and extol the commanding ones, as Nietzsche did, or to reverse the sympathies, as Leo Tolstoy did, or to pit one against the other, as Francis Fukuyama's concept might unintentionally imply.

The principle of ethical equality, not the equality of numbers, is one of the points of my definition for liberalism, together with compassion, understanding, and skepticism.

My equality is the equality under the bell, i.e., under the laws of nature, and not under the laws of the book. Any book might be short of compassion and reason and should be taken with skepticism.

Having come from the Soviet Communism known in the West for inhuman cruelty, I have often been struck by the cruelty and irrational excesses of the American law in both punishment and reward. The maximum prison term in the Soviet Union was fifteen years.

The bell-shaped distribution is the law of nature. The potatoes may be of different size, but they all are the farmer's crop. The absolute majority of people we are attached to are close to average.

Here, however, I am interested in the big potatoes of creative energy.

I believe that there are two basic creative attitudes to life. I would call the extremes **leaders** and **dreamers**. An alternative term for **leader** is **dealer**.

Artists and philosophers were pure **dreamers** because they produced new ideas and images that required little physical energy and can be done strictly individually, without a team. The dreamer manipulates words, brush strokes, sounds, images, words, ideas, and, sometimes, modest hardware. A teenager at the computer is also a dreamer in this sense.

Leaders, like Napoleon, could impose their will on huge armies and bring them into motion with destructive and constructive goals. Realization of the goals often required spending enormous physical energy and could never be accomplished individually. Pyramids of Egypt and America are classical examples.

The leader creates the desired order by will and power. Most of human history has been driven by the extreme leaders: king, emperor, gray cardinal, general, industrialist, organizer, founder, revolutionary, national leader, etc., who does not necessarily wins. A leader can be liberal in the common political sense. The essence of being a leader is to be strong. The leader manipulates fellow humans like the teenager the keyboard, Hegel ideas, and the Pharaoh's builder the stone blocks. In essence, however, it is the same abstract game of Lego.

There is a big and radical difference in the position of the leader and the dreamer. The leader simply makes what he or she wants by **controlling** (see **Essay 15. *On menage a trois in the Stone Age***) resources of energy, labor, and human emotions. The leader sets the rules of the game, like the Nietzsche's Superman (ironically, the liberal cartoon Superman simply solves daily problems without setting the rules).

The leader is strong with all his human weakness.

The strength of the week is in their large numbers while the strength of the strong is in small numbers of competitors.

The dreamer is weak because he is alone, although he can be humanly strong. The development of individualism in the Western civilization, since the Greeks and through Christianity, taught him that his life was as valuable as any other. This idea, that might have looked crazy to the pharaohs and Chinese emperors, could appear only in

communities of a medium size, more than family but less than kingdom, i.e., in the city and city-state. The pressure in the pumped-up tire is the resistence of molecular individualism.

The dreamer seeks protection from social harm by appealing to a force as strong as that of the leader: the law based on the principles of individual freedom and equality, i.e., the liberal democracy that does not make the dreamer stronger but makes the leader weaker. The dreamer believes that he can survive alone in the environment of equality where predators are declawed. But in his heart, the energetic dreamer never believes he or she is equal to others.

Liberal democracy would be wishful thinking of the dreamers if not for the Industrial Revolution and capitalism.

Democracy displaced monarchy for different reasons in different countries. Revolutions were made by leaders along the ideas of the dreamers, but they also transformed some dreamers into leaders. At some extent the new order has made most common people dreamers of a kind, literally, with the run of the mill dream of the pursuit of happiness. The average citizen of democracy is a mini-dreamer whose dream is to win a fair competition, but there is no fairness in big numbers, only probability.

The great paradox of equality is that you are lost in it, unless there is a hierarchy, i.e., inequality. You are lost like a book in a big library without a catalog. You are lost until somebody tells the potential readers that you exist whether as individual or as a category. You are lost like a site on the Web unless it is linked to star sites. Liberals pursue equality in the hope to distance themselves from it. They believe that somebody else will be lost, but not they.

Fighting the depressing equality, individualism creates hierarchies, pecking orders, ratings, stars, and satellites. It means giving recognition to dozens of small and temporary Napoleons and Hegels, Shakespeares and Rembrandts of the day. The spontaneous generation of dynamic hierarchy by liberal democracy is the phenomenon that plays the role of an automatic control that keeps liberalism at a certain steady but slowly drifting state.

Liberalism is self-contained, while despotism can be unopposed. This is why liberalism is not as suicidal as it may seem. Too much liberalism is as improbable as too much body height. Besides, there are always embryos of future leaders in the cocoons of dreams. The leader has no heirs.

The lonely dreamer can stand against despotism only if he is a soldier of an army of volunteers, and this is possible if all the other soldiers are in sync with him. The strength of the democratic army lies in its numbers and in three pieces of weaponry: voting power, labor power, and consumer power. The dreamer unites the crowds with his or her liberal ideas that require maybe just a cup of coffee to be formulated, while the despot needs

well fed goon squads, tanks, and prisons to contain immaterial ideas—the goal doomed from the start, but, probably, only in the long run.

It is remarkable how recent social evolution has been taking away a good part of the voting power and labor power from the masses by developing the national and global economy that depends on the individual voter, worker, and consumer. The political reality has made politicians more interchangeable and the choice between the candidates less crucial. The economic system and the related culture of consumption and debt made the labor less willing to take risks. But the role of the consumer shot up. The consumer became the omnipotent democratic constituency. This fusion of consumer base with political base is, in my opinion, one of the most pronounced and funny to watch trends of liberal democracy. No wonder that free market is a liberal ideal.

Any member of the creative elite of dreamers—artist, scientist, writer, pop star, and philosopher—produces goods for sale and has no desire to limit his consumer base by alienating buyers, students, grant review boards, readers, listeners, and minorities because in the consumer society the punishment for narrowing the consumer/constituency base hurts incomparably more than it did two centuries back, in the mansards of Montmartre. Here is a telling illustration of the fusion of politics and economy:

> The growing black middle and working classes put their money and the bodies on the line. In addition, because the consumer economy depended on consumer purchasing, black demands had to be taken seriously. By 1970, black buying power topped $25 billion, a large enough sum to make the threat of boycotts an effective weapon for social change.
>
> (Harvard Sitkoff, *The Preconditions for Racial Change*, from: *A History of Our Time: Readings on Postwar America,* Edited by William H. Chafe, Harvard Sitkoff, New York, Oxford: Oxford University Press, 1987, p.153.)

It is funny to watch how a politician who is supposed to be a leader becomes a dreamer navigating between the irreconcilable consumer/constituency tastes. Today every presidential candidate says "I have a dream" after one of a very few true leaders who were also true dreamers.

Like order and chaos, liberalism and anti-liberalism, whatever the latter is, are only the extreme ends of the continuous scale. Whoever calls for equality, calls for the inequality of the bell curve. Whoever calls for inequality, all the more, calls for inequality.

Theoretically, there are two possible opposite political doctrines: one is for the normalization of the bell curve (political and market liberalism) and the other, like the gardener who cuts the apple trees, is for interference with it, i.e., denormalization of the curve (slavery, apartheid, cast system, class and group politics, entitlements, and war on either poverty or wealth fall into this category). There is yet another possible pair: one calls for narrowing the distribution tight around the average (this is close to socialism), and the other calls for flattening it (the law of the jungle or food chain). Finally, the third possible pair calls either for raising the temperature (cultural liberalism) or for freezing (totalitarianism, fundamentalism).

The property presented by the curve can be any, but wealth, income, knowledge, and opportunities are never distributed along the normal bell curve, see **Essay 31, On Poverty**.

❄ ❄ ❄

This subject is inexhaustible and it is not my intent to burrow into it any deeper. If it were, I would next explore the phenomenon of the **star**, individual as well as corporate, this new embodiment of Superman, Superwoman, and Superchild that pushes aside both leaders and dreamers, and how liberalism entrusts bureaucracy to enforce hierarchy, and how liberal society inadvertently loses in conflicts with non-liberal ones on the global arena.

My rational intent was to add to my **Essay 9, On Work** that **understanding is compassion** and it may be very humane to complement dark Hegel and Nietzsche with some undergraduate laws of nature.

My irrational intent was to confess that I am a deeply convinced liberal and ashamed of it because, enjoying liberal democracy, I believe that somebody else will get bad luck, while I will have all the juice.

Like the King Midas who shaves himself, I am confessing to the hole in the ground that I have donkey's ears. Having done that, I feel less shame. Probably, I am not that much liberal, after all. But just one look at the Web sites of anti-liberals drives me back to my true flock.

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NOTES:

1. Vilfredo Pareto(1848-1923) should be mentioned in connection with the bell curve, Maxwell-Boltzmann distribution and with Nietzsche because of his highly original and anti-liberal in modern sense sociological concepts that I find strongly realistic and physical-chemical in nature. Pareto, an engineer by education, compared society with molecular system in equilibrium. In his time the non-equilibrium thermodynamics was in embryo. Pareto called groups of individuals of high achievement in their fields *elites.* Pareto demonstrated the influence of competition on the non-randomness of the distribution of wealth and offered his own curve known as Pareto distribution and having nothing in common with the bell. He was blamed (or praised) for fascism.

More about Pareto: **Essay 31, On Poverty** .

2. NOTE AFTER SEPTEMBER 11, 2001. *Somebody else* died in unthinkable numbers.

2001

Essay 17. On Complexity

[complexity, unified picture of the world, Ulf Grenander, pattern theory]

Sciences on one side and humanities on the other seem to be separated by a cultural chasm that became obvious to C. P. Snow in 1959. There was no such sharp divide in times of Lucretius (94?-55? BC), Aristotle (384-322 BC) , St. Isidore of Seville (560-636; he is Patron Saint of: computers, computer users, computer programmers, and Internet), Leonardo da Vinci (1452-1519), and, actually, up to the times of C. P. Snow. The scientists in the beginning of the twentieth century were men and women of general humanitarian culture, with interests in arts and humanities, and Albert Einstein is a popular example. Some familiarity with science was also a part of general culture. Science was an aspect of human curiosity and creativity and technology had just started its Cambrian Explosion: dramatic diversification of types of products.

The change around 1960 was, probably, a result of the new role of science and technology and the divergence of the life of Things from the life of humans (see **Essay 4, *On New Overcoats***). Science and technology smoothly wriggled out of the shell of general culture as a separate second culture because of:

- ❒ increased competition for human time (see **Essay 2, *On the Chronophages or Time-eaters***) between both,
- ❒ decline of the monetary reward for humanitarian knowledge and expertise, and
- ❒ overwhelming complexity and specialization of science and technology.

In my opinion, the divide between sciences and humanities is not absolute. The shared human language unites the two cultures like the language of genetic code unites all living forms.

> **...Conductivity, wavelength, voltage, electrophoresis.....temperature, entropy, energy, order.....class struggle, revolution, domination.....gene, meme, DNA, selection virtue, happiness, suffering, duty, love, perfection...**

The vocabulary of sciences and humanities spreads from narrow and highly special terms of natural sciences, like **tensor, mitochondria**, and **quark**, to the words of strictly humanitarian usage, like **guilt** and **hubris** (they might be appropriated by physics in the future).

At some historical point, a word of the common language (for example, **charge, decay, resistance**) was selected as a scientific term, usually, for the reason of analogy. Other scientific terms were originally invented for internal use, but later infiltrated humanities and common language (entropy, diffusion, algorithm) for the same reason. Latin and Greek roots went both ways, retaining their general meaning. Thus, the Latin *posse* (have power), gave **potential, power, possibility**, and **impotence**).

I believe that if there is a substance of the unified knowledge, it is analogy and metaphor. I believe that at a certain level of abstraction, a large picture of the world can appear, which we cannot see by using narrow terms. Accordingly, if we use either wide and vague or exact but very abstract terms, we cannot see the details of the picture. It is a tradeoff. We are not trained to see the whole because our education and division of mental labor reflects the historic evolution of knowledge with its diversification and specialization into philosophy, literature, physics, biology, and thousands of narrow strips.

Human nature, living nature, and physical nature are separated only in our mind. For an observer from Mars, they both are the Nature of the Earth, but only because of a big distance.

Charge, energy, power, speed, acceleration, resistance, competition, even **culture** (microbiology and anthropology), **strange** and **charmed** (quarks), together with scores of other words, are in common use by both sciences and humanities. Although theoretical physics tends to break with analogy, even the **color** of quarks is not just a nostalgic artifact of sensual perception but a meaningful analogy with the three basic colors.

The unified picture of the world is in the state of a permanent growth, like a regenerating tissue covering the lesion. To watch pieces of this jigsaw picture join and fuse has been my major single passion. Strangely, the picture has been getting only simpler with time. But you can never make money on anything simple except aspirin, and the adepts of a unified world picture will crouch somewhere below the English Major.

There is another ambidextrous concept that overstepped the divide from the humanities to natural sciences: complexity.

It seems that the complexity of modern life is as oppressive as a humid hot July day in a big city. Simple living becomes a dream, but a related Web site looks like a window into complexity.

Regulations, laws, rules, tax code, OSHA and EPA requirements, paperwork, documentation, bureaucracy, special interests, political correctness, politics, economy, technology, computers, programming, education, science, air transportation, parking space, ethnic fragmentation, ethnic sensitivity, world community, international relations, police activity, globalization, dealing with protesters, Arab-Israeli conflict, ethics of medical research, spread of AIDS, religious influence on secular life, and countless other issues are components of modern complexity.

Fortunately, the growth of complexity is partially offset by its loss. Thus, the relations between people seem to drift toward simplification. The loss of loyalty, for example, takes a good deal of complexity fall off our shoulders. The topic of the loss, however, better suits a separate essay (see **Essay 34. On Loss**).

We can certainly solve all the problems, except finding parking space downtown, by having a czar with full power for every problem that cannot be solved by a town meeting. We would simply overturn any czar who acts against majority. Social complexity, therefore, displays between the simplicity of absolute dictatorship and an ultimate democracy.

What is complexity? What is more complex and what is less so? How to measure it?

The subject turns out to be very complex. Complexity today means:

- ❒ a particular science about large **dynamic** systems, strongly impregnated by mathematics,
- ❒ difficulty of understanding (i.e., **amount of work** needed for understanding, which is not as shallow as might seem)
- ❒ the **static** property of being complex, often, in a very narrow aspect, like complexity of calculations and computer programs, but also in a wide view, like complexity of a civilization.

A host of definitions can be found and to review the subject would take a book. I will limit myself to references to Murray Gell-Mann, John Horgan, and Chris U. M. Smith. None of the sources on the Web or otherwise seems satisfying to me as far as the big picture is concerned.

I am going to present my understanding of what complexity is by playing with a set of nine Lego-like blocks that can be connected in various ways.

First, let us examine a block:



This is a **description** of the block:

> This block is a square with four connection points shown as red and blue dots, according to the picture. The block has its top and bottom, as the fill shows.

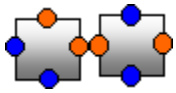
Here is another block:



It differs from the first in the location of the dots. Here is yet another such block:



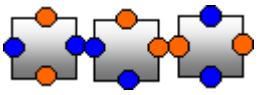
This is how two blocks can be connected:



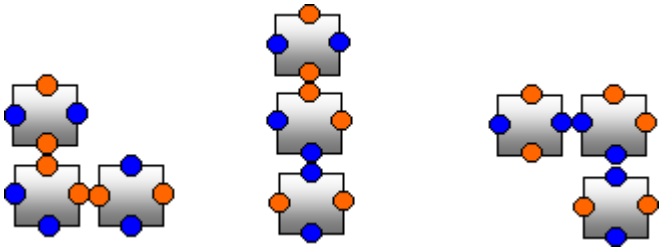
These are **rules** of connection:

> The blocks connect by touching with the dots of the same color.
> They do not rotate in the plane. They do not flip.

Here is a combination of all three blocks :



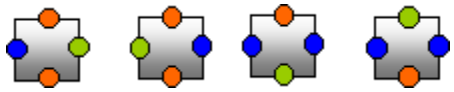
Here are some other combinations:



The **blocks** and the **rules** of connection define a space for all possible combinations and form a kind of a creative system for producing combinations. We will call the system of the above three blocks and the rules of connection SYSTEM 1. It has a certain complexity that we don't know how to measure. We can compare, however, two systems that do not differ much, i.e., **one is produced from the other in a small step**.

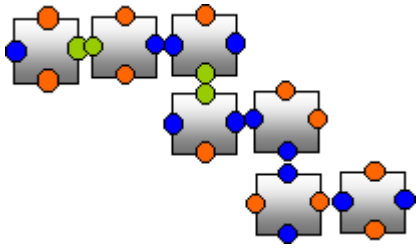
This is how it could be done.

Let us form a new system by adding four new blocks, without changing the rules.



Although we add more blocks than there were initially, this is a small step. If it seems big, we can add them one by one. If we changed the blocks and rules at the same time, it would be a bigger step. But we can always divide a change into minimal steps (an assumption).

> The new blocks (not the system yet) are **more complex** than the previous three because they have **more** kinds of dots: three colors instead of two. Therefore, the new system, let us call it SYSTEM 2, is **more** complex.
> SYSTEM 2 with seven blocks is **more complex** than the system with either three or four blocks because it uses **more** different types of blocks, some of them **more** complex.
>
> This is just one example of what we can make of the seven blocks.

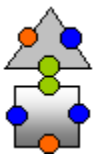


Naturally, the number of combinations in SYSTEM 2 is larger than in SYSTEM 1.

Now let us try something quite new: a mutation of the shape. We add two identical triangular blocks:

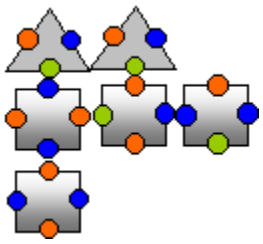


There is only one way we can connect such triangle with only one of the seven:



This SYSTEM 3 of nine blocks is **more** complex than SYSTEM 2 because it has **more** types of blocks: square, as well as triangular.

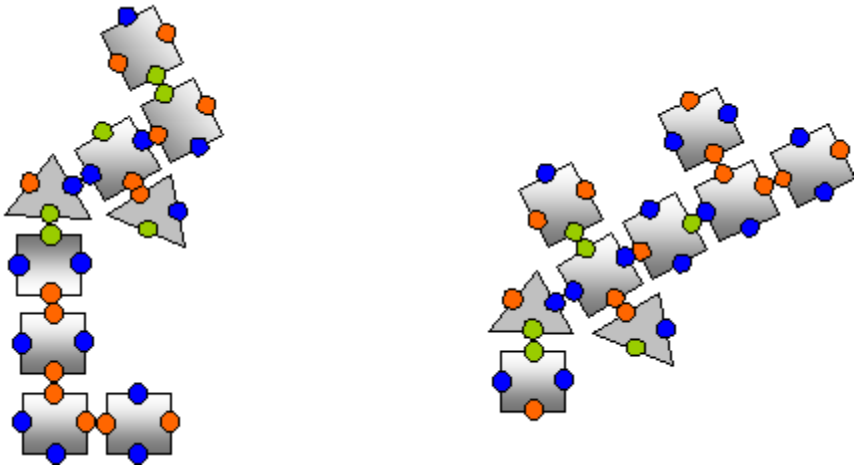
SYSTEM 4 comes next, in which the **rule** of matching colors is **relaxed** and the following combination, for example, is possible (it does not use all nine blocks):



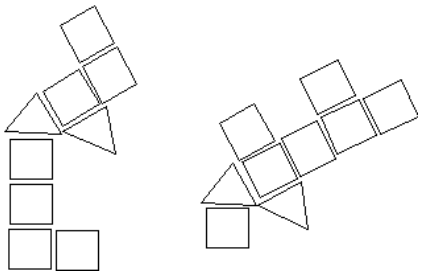
SYSTEM 4 is **less** complex than SYSTEM 3 because it has **less** rules, **even though it generates more combinations**. If dots of all colors are equally connectable, then they can be reduced to just one color, which makes the blocks much simpler.

We can have more combinations by allowing rotation of the blocks in plane (SYSTEM 5). We will require, however, the sides of the blocks be approximately parallel.

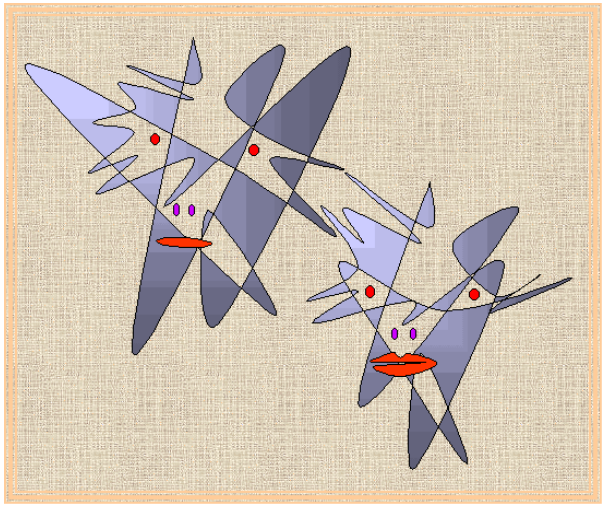
The next two combinations by the rules of SYSTEM 5 look rather complex:



In fact, with the relaxed **rules** of connection, we can eliminate not only the colors, but also the fill that distinguishes between the top and bottom of the squares, and even the dots, so that the above combinations look very trivial:



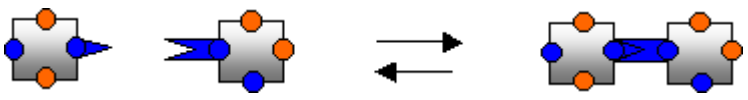
A completely chaotic system, without any rules and with simplest blocks, is very simple. The billiard balls form such a system on the pool table.



One can try designing various Lego-like systems and studying their complexity. The Microsoft Draw, which is a Microsoft Word function, is very convenient for this. It allows for a rather high complexity of combinations. I drew a picture (120K) on the left made of closed lines and fills. At this point I let the reader guess what the rules for the combination were and how complex it is.

To summarize, instead of trying to evaluate complexity of a single object, we do it **for the system that generates** it. All the objects generated by the system are of the same complexity, however they look. It seems to contradict our intuitive concept of complexity because large combinations look more complex than a single block or a couple of blocks. We should not mix up size and complexity, however. Still, we can take the number of different blocks in combinations within the same system as a measure of a partial complexity within the same system.

The type of connection can vary, too. For example, it can have a direction and require two different types of connecting points, which would add to the complexity of the system :



I don't believe it is possible to find a universal numerical measure of complexity for everything in the world. Moreover, it is not necessary. Instead of measuring complexity

of an individual object by a number, we **compare any pair of systems** and by transforming one into another, we can trace the number of steps that reduce or increase complexity. We may not have an exact measure in complicated cases, but we can still have a good idea about the difference between two systems. We might have even a scale of complexity by selecting a zero point.

In this concept of complexity I use the same principle that Confucius used to quantify human virtues: by comparing two selected individuals and thus establishing a partial order in moral values (see **Essay 13. On Numbers**). It is the same approach as with the beauty contest. There is no absolute numerical measure of beauty but we still can run a beauty pageant by ordering the contestants.

This concept of complexity, which I would call pattern (or chemical) complexity, is based on fundamental ideas of Pattern Theory developed by Ulf Grenander. It is not limited to static structure and can be applied to dynamic systems where transitions from one static structure to another take place according to a separate set of dynamic rules. I came to Pattern Theory from chemistry, which can be considered as an application of Pattern Theory.

The main idea of Pattern Theory is that most (if not all) of our knowledge about the world can be presented as blocks connected with bonds. This atomistic principle comes from deep antiquity, from Democritus, but Ulf Grenander developed the simple ancient idea into a rigorous mathematical (and by no means simple) edifice. The ideas, implications, and applications of Pattern Theory are inexhaustible. I tried to outline some in my manuscript *The New and the Different*.

Ulf Grenander and I attempted to apply Pattern Theory to history in our *History as Points and Lines*, with no prospects of publishing until history changes its course.

Pattern theory covers not just ethical systems, beauty contests, and Lego, but also social relations, biological forms, digital anatomy, molecules, genealogies, language, philosophical ideas, personal relationships, and Everything in the World.
Pattern Theory presents a universal abstract language for describing any system of any complexity. Therefore, it is also a language for describing evolving complex systems. It does not discriminate between sciences and humanities.

One way to solve a problem is to appoint a czar. A town meeting is another one. The third one is to ask a sage.

NOTES

1. Researchers involved in measuring complexity can compare the pattern complexity with Kolmogorov's complexity and its controversial implications concerning random sequences. In pattern complexity, anything without rules is

inherently simple.

2. In authoritarian society some blocks have many copies and are interchangeable, and others have a few or one. In liberal democracy, ideally, all blocks are unique, but the function of bureaucracy is to keep the uniqueness down.

3. The following is the inventory of the individual blocks used in this Essay. They don't have either names or numbers. They are their own symbols, like pictograms in hieroglyphic script. By writing particular terms on the blocks and specifying rules, we can construct particular systems in various fields of knowledge, from poetry to molecules.



4. **Pattern Theory**: Ulf Grenander, *Elements of Pattern Theory*, 1996. Baltimore and London: Johns Hopkins University Press.
Ulf Grenander, *General Pattern Theory*, 1993. Oxford: Oxford University Press.

2001

P.S. (2016) It occurred to me while re-reading that complexity, **like energy**, does not have any absolute measure and can be only compared for two objects. It is, probably, an evidence of the fundamentality of the concept of complexity. But I can only raise the question whether a unit of complexity exists. I doubt it does. In Pattern Theory, it depends on a subjective knowledge and choice of an observer of images, templates, and configurations. Complexity is a bridge between sciences and humanities. It is mathematics with an anthropic principle: it makes sense only because humans exist.

Essay 18. On Everything

[complexity, code, unified picture of the world, pattern theory, Ulf Grenander, dematerialization, US Tax Code]

Everything in the world is what we know about the world. What we know about Everything is its representation. Representations can be:

- ❒ pieces of cardboard with words written on them, arranged in a certain order,
- ❒ images on the computer monitor, made with a drawing software,
- ❒ words of common language, arranged in texts,
- ❒ words in Ancient Egyptian language revived and modernized like the Hebrew language in Israel, with an addition of modern pictographic signs, pictures, drawings, graphs, charts, and blueprints,
- ❒ completely artificial language using esoteric symbols from sci-fi movies,
- ❒ computer files,
- ❒ heavy stones with chiseled symbols, like Hammurabi Stele and Mayan inscriptions.
- ❒ knowledge stored in human brains (we do not know how, yet),
- ❒ other combinations of any blocks, as well as combinations of the above.

The function of the language is, ideally, to name one thing with one name and to show the connections between the things through the connections between the names.

The block  from **Essay 17. On Complexity** represents only itself. We can represent it in many other ways, for example, with letter **B**. We can also make it represent letter **B** : 

. Therefore, **B** will mean  and 

will mean **B.**

We name one thing with one name within a language, but there could be many

languages. This is Ka  and this is Ba  in Ancient Egyptian (see **Essay 15. On *menage a trois* in the Stone Age**). They have also meanings that can be expressed as: Ka is "body double" and Ba is "soul." Or: Ka is "two arms joined at the shoulders" and Ba is "bird with human head."

Genetic code is also a language in which ATG, for example, means the amino acid methionine that can be seen further below. In the language of DNA, sequences of four symbols A, T, C, and G **code** sequences of twenty amino acids.

Coding can also be fuzzy. We can say that an English text codes a French text. The reason why we don't like saying that is the ambiguity of languages that tend to deviate from the rule "one thing, one name." A synchronic interpreter who listens to a French speech and renders it in English works like the reproductive apparatus of a living cell that reads DNA, translates it into RNA, and further churns out the proteins. An often sophisticated apparatus of decoding or translation is necessary for the process. Borrowing terminology from molecular biology, we can say that the apparatus **expresses** the code. Expression is a particular case of translation when the code and its translation are very different in nature.

There are some examples of the blocks combined by the color rules, in continuation of **Essay 17. On Complexity**. This time the blocks have meanings. They are the words of a language and they code some real things.

A molecule of water consists of one atom of oxygen, O, and two atoms of hydrogen, H:



ATOMS WATER

We could use different blocks for representing water, for example, the letters:

W-A-T-E-R

Our chemical choice of representation, however, reveals how the family of chemical compounds is structured. With the same symbols we can portray at least three other compounds, hydrogen, H_2, oxygen, O_2 , and hydrogen peroxide, H_2O_2:



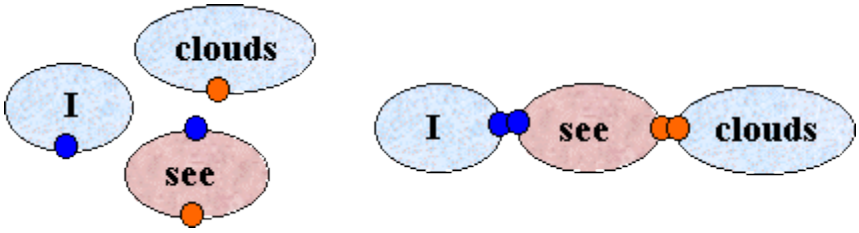
Hydrogen Oxygen Hydrogen peroxide

This symbolic language saves us a lot of words because it reflects some properties of real atoms and molecules. It does not mean that molecules look like their symbolic representations. Both water and hydrogen peroxide molecules are angular. We cannot learn chemistry simply by looking at the chemical formulas. Even the more realistic molecular model of an amino acid called **methionine** on the right is approximate. ⇒.

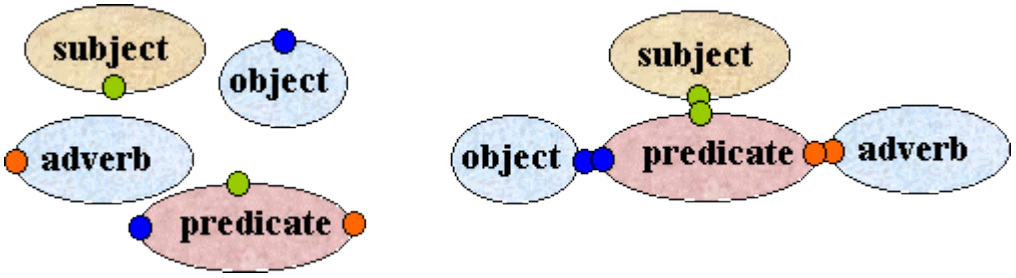


There is much more complexity in chemistry. In the picture of Everything, the physical laws of nature should be added to the material blocks, serving as the rules of stability and transition from combination to combination.

The next two examples represent a thought:



and a grammatical structure of a phrase:



Pattern Theory, even in its conceptual core, is incomparably richer than my reflections on it.

In its terminology the blocks are called **generators**, their color dots are **bonds**, combinations are **configurations**, and their "families" are **patterns**. A certain probability (or energy) is attributed to the connection (**bond couple**) between two generators through

their bonds, which makes the world of patterns strikingly similar to chemistry, and, in general, to the real world, whether we speak about atoms or ideas.

In Pattern Theory, some blocks "prefer" (have a high probability) to stick together, like letters **q** and **u** in English, and others are afraid of each other like the sounds of **k** and **n**.

When I first opened a book by Ulf Grenander, around 1980, I immediately recognized in Pattern Theory a chemistry of Everything. But the best way to learn about it is to go to the original. Playing with Lego may serve as an introduction.

My final example from the zoo of Everything is more complex: a paragraph of the US Tax Code (see **Essay 13. On Numbers**):

> In lieu of the tax imposed by section 1, there is hereby imposed for each taxable year on the tax table income of every individual whose tax table income for such year does not exceed the ceiling amount, a tax determined under tables, applicable to such taxable year, which shall be

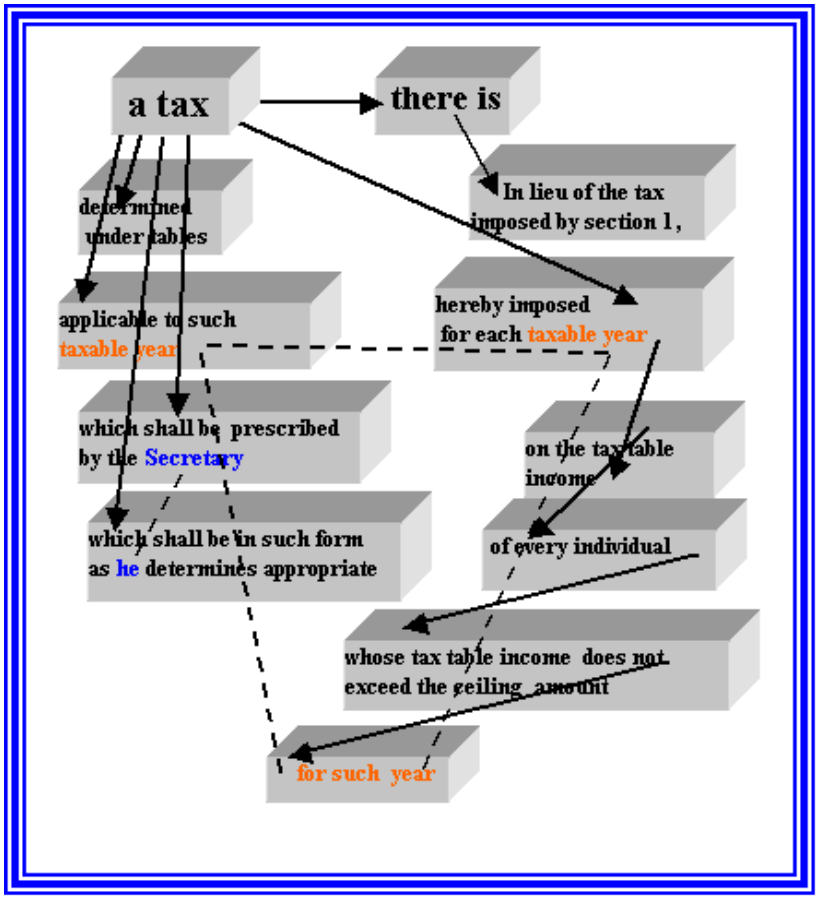
The Tax Code is a code, indeed. It codes the procedures used by taxpayers, accountants, and IRS officials. So I am supposed to believe and in Government I trust.

In order to show the design of the excerpt and get an intuitive measure of its complexity, I split it into semantic boxes and show the connections between them on the next page. I realize that I could have misunderstood it all because I still have doubts—but this is what complexity is for—and the one who has doubts is weak and needs a counselor—and this is what complexity is also for: to create and run a metabolic cycle of money.

Each group can be split, in a similar way, into smaller word-size linguistic blocks, like a building can be dismantled by floors, rooms, and, finally, turned into a pile of rubble.

Conversely, we can imagine the construction of the building from pieces of building material, and if the material is stone blocks, it will be a hell of a work. This is why I believe that complexity can be alternatively defined as the physical work needed to understand/build/dismantle an object (see **Essay 17. On Complexity**). For the text like that in the Tax Code, it can be the amount of glucose consumed by an average brain until

it is fully understood. In dollars, it is, probably, the cost of education needed for instant understanding of such texts.



If there are no rules of connection whatsoever, we can just leave the materials dumped on the ground in no matter what order.

> **NOTE**. In the real physical world, we still need a certain level of chaotic energy (i.e., temperature) to maintain chaos of molecular movement. Even chaos is not free. Imagine how humiliating it should be for humans to create chaos by work, not heat. That was the physics of punishment by hard labor in quarries.

Now that I have outlined the universally granular, atomistic, modular, and prefabricated design of Everything, whether of the Empire State Building, or atoms, or words, or numbers, I must acknowledge that Everything is not homogenous. I have to partially recall my claim on the universality. It will be as far from the truth to equal a skyscraper with the word "skyscraper" and even with a complete blueprint of the skyscraper, as to equal the death on the movie screen with real death. Yet there is always something in the non-truth!

❒ A chemist looks at chemical formulas, manipulates them on paper or on file, and comes to new combinations. **A large and complex apparatus** of research labs, pilot, manufacturing, and marketing facilities turns the visual **code** of a new drug stored as a file in a computer, into pills for **sale** in pharmacies.

❒ An architect draws crude outline of a building, makes it more specific, manipulates it, using CAD software, and **a large and complex apparatus** of design, construction, accounting, and marketing facilities turns the **code** (blueprint) into the real building for **sale.**

❒ A script writer makes a script as a computer file, manipulates with it, sells it, and **a large and complex apparatus** of movie industry turns the code (script; sometimes changing it beyond recognition) into a movie for **sale** in theaters and video stores.

❒ Similarly, a **code** of a legislative idea in an ambitious head is turned into a law enforced by a **budget**-taxing **large and complex apparatus** of police, courts, lawyers, and prisons.

❒ A **code** of a space shuttle is turned by the **large and complex apparatus** of NASA into a multi-billion **dollar** adventure.

❒ A **code** of a sacred religious book, interpreted in different ways, contributes to legal codes and ways of life as different as those of Malaysia, Turkey and Afghanistan, with different **economic** consequences.

❒ DNA **codes** unfold into a new human being in a mother's womb, or an oak, a whale, an ant. Right before our eyes, a new **large and complex industry** emerges which could manipulate with the code in the form of computer file and turn it into a designed organism for **sale**.

❒ A **code** of knowledge in a young human's head is being manipulated by education and upbringing. By extension, we can foresee times when the knowledge code will be converted into a computer file, manipulated, and inserted directly in the brain, with a corresponding turnover of **money.**

❒ It is the **large and complex** apparatus of human civilization that creates, manipulates, and expresses codes with **money** playing the role of energy currency, like ATP (see **Essay 7. *On the Smell of Money***).

Both the code as content and its "real" material form are combinations of elementary units. If the instructions for building a house were carved in stone, like in the Rosetta Stone and Behistun Inscription, it would take almost as much time and energy consuming to manipulate them as to build a house from stone. Only ideas in one's head could be manipulated swiftly, but, as a tradeoff, we do not have a full control over our own thinking.

The ancient technology developed slowly because the technology of writing was expensive and available only to a small group of literate people. Even now, the inventors who possess, together with poets and theoretical scientists, a rare ability to manipulate complex images in their head, like to play with the hardware—the big Lego that is its own code—and later convert the "real thing" into a verbal or graphic code.

The human mind, like an entire civilization, expresses intangible ideas in visible and audible words.

Instead of the duality of spirit and matter that classical philosophy was preoccupied with, I believe that the duality of the code and its representation is what really determines essential aspects of the joint civilization of humans and Things and splits Everything into two categories, almost like sexes. It must be noted that in Pattern Theory, spirit and matter are treated equally.

Both the code and its representation are material, including ideas. It takes glucose to both think and speak, as well as write and punch away the keyboard. The digital code, however, which is the DNA of Things, differs from the Things in three major aspects:

DIGITAL CODE	**THINGS**
A change of the code requires a ridiculously tiny (the theoretical minimum is a quantum per bit) amount of energy.	A change of a Thing requires substantial (i.e., much more than a quantum) amount of energy. **Example**: Unscrew a nut, change a tire.
Any minimal change of the code (one bit) requires the same amount of energy **NOTE**: The last statement may not be absolutely true because computer memory is a Thing and the information in it is stored in a metric space where work depends on distance. Same holds for the brain as storage medium.	Any minimal change of a Thing depends on the nature of the change. **Example:** It requires more energy to take out an internal block of a Lego structure than one on the surface. Writing letter W by hand consumes more energy than writing number 1, but typing it in the computer consumes the same energy. Consider also rearranging furniture and highlighting and dragging a word on the screen (the visible image is a Thing).
A code can be erased without a trace	A Thing cannot be erased without a trace: matter is conserved.

> **NOTE**: I do not use the word **information** here. I want to distinguish between the things that can translate into other things, provided the apparatus, and the things that cannot. Yet presence or absence of information is exactly what divides Everything into the two "sexes."

In short, the digital code can be written, manipulated, duplicated, and annihilated by finger touch .

The deep reason for the unusual properties of the digital code is that a bit of information is represented not by an irreversibly fixed material object, like in the cuneiform clay tablet of Babylon, letters written in ink, or printed documents, but by a **state** of a material object that can be indefinitely alternated between two states with minimal physical work.

In cultural history, the reversible electronic substrate of memory has no precedent and no analogy. Human memory cannot un-remember and re-remember the forgotten. It seems to fit an ephemeral, fluid, and childish civilization that lives day by day. But in fact, our civilization has both the newly acquired digital reversible memory with enormous storage capacity and the traditional long term paper memory stored on the shelves of libraries and archives. With its dual—hard and soft—memory, our digital civilization is an unprecedented turn in evolution. Owing to computers, it can exceed the individual brain, and *vice versa*. Still, the possession of both memories, hard and soft, rises the intriguing question of senility and infantilism of civilizations.

> Hard memory can be made reversible through the rewriting of the kind described by George Orwell in 1984, but only if it stores all rewritings.

In five years, most links to these Essays will be dead. The search, hopefully, would provide new ones. Hopefully, the noble and democratic Google and Guttenberg will still be free (Britannica is not). This is what makes the Web inherently juvenile: knowledge flows through it like daily impressions of a teenager who has a feeling that he or she is in a quick transition and the teen days are numbered.

With little emphasis put on the long time memory and decline of education that gives the keys to the libraries we seem to be sliding into infantilism. We simply do not have time to remember (see **Essay 2. *On the Chronophages or Time-eaters***). Whether a long time cultural memory and the knowledge of world history, including history of science, really give a young person any advantage in a vehemently materialistic civilization, I don't know. It seems to die off, like the European opulent fashion of the past centuries is dead in the times of body piercing and the above midriff tops.

The properties of the electronic code make our digital civilization naked and vulnerable because for the first time in history a single person with only modest hardware, limited education, and no army can wage a symbolic war against large, complex, and powerful organizations like US Government and Microsoft by accessing and manipulating parts of their codes. The digital civilization will adapt to this inherent threat but the viruses will adapt, too. Our sweet favorite toys are brittle and soluble like lump sugar.

At a quite different level, manipulating genetic code, which is still beyond capability of an average person, establishes new and unprecedented links between the blocks of technology, culture, market economy, and human nature, making the entire web of civilization look like the US Tax Code.

Human body, acquiring some properties of a Thing, claims its share of the limited resources of free energy, and something else has to move over. There is one probable

outcome: humans have to become simpler, standardized, and streamlined, preferably, immersed into a disposable and recyclable culture. That was the idea of the imaginary Orwellian world and the bygone Soviet Communism.

Francis Bacon identified knowledge as power in 1597. Knowledge as the code of Everything has always been used for slow laborious creating, manipulating, transforming, and destroying objects of real world. The unprecedented physical ease of manipulating the code and its material expression came with the digitalization and 3D-printers.

The digital code is an object that is its own code. It represents itself. This seeming dematerialization of the digital world is a historically new phenomenon, which the humans will have to adapt to, probably, paying a price for heavily insulating the code and locking each code into its own Fort Knox. That would quickly materialize it back and set on the firm ground. This is what evolution did with axons of neurons when it insulated them with myelin. Multiple sclerosis destroys the insulation and wreaks havoc on the brain.

The digital world, therefore, is only a part of Everything.

In a particular, though peculiar, frame of reference, Everything can be classified in terms:

Dual (i.e., existing as code and its expression: organisms, Things, robots...)	or	**Monistic** (symbols, inanimate natural objects, galaxies, codes, science, art...).
Code (digital, genetic, verbal, graphic, etc. ...)	or	**Expression** of a code (Things, organisms, organizations, procedures, robots, etc.)
Natural (organisms, galaxies, rocks, personalities, etc...)	or	**Man-made** (Things, carved rocks, codes, hardware, science, corporations, art...)

Thus, a painting by Rembrandt is man-made and monistic. Our planet is natural and monistic. Lion is natural and dual. A blueprint for a toaster is code, monistic, and man-made. A file on a hard disk is dual and man-made code (in short, digital code).

The above tentative classification of Everything is not only fuzzy and overlapping, but also evolving, with objects migrating from one compartment to another, as it is happening with organisms. Humans are right at the zero point of this anthropocentric system of coordinates and are Everything: dual and monistic, code and expression, natural and man-made.

As Martin Heidegger wrote, "the involvement of Being in human nature is an essential feature of Being." My point of view, however, seems to be directly opposite of Martin Heidegger's absolute dichotomy between human and non-human. I do not see sharp borders between human and machine, human and animal, human and Thing. I take human as the central reference point only because I am human. If I were a philosopher-dog, I would classify the world in terms of edible-inedible, familiar-unfamiliar, threatening-inviting. Because I am a little bit of a dog, this classification is meaningful for me, too. The reverse is not true. But if I am right, then Heidegger is also right, and *vice versa,* which means that all that does not matter (see **Essay 8. *On the Buridan's Ass***).

When I read "The proposition ‘man exists’ means: man is that being whose Being is distinguished by the open-standing standing-in in the unconcealedness of Being, from Being, in Being" (Heidegger), I feel powerless to break it down into semantic boxes. Probably, it all depends on what "is" means.

What is the possible future of the relationship between humans and Everything?

I believe that human nature is as much conservative as adaptable. Culture swings back and forth between large opposite patterns, probably, even on the scale between generic barbarism and generic renaissance. In a balkanized culture (see **Essay 11, On the Rocks**), and in the geopolitical world, the phases of the swinging may not coincide in different nations, social groups and minorities. Metaphorically speaking, however, different pendulums suspended from the same support tend to synchronize with time.

I am reluctant to share either conservative or leftist resistance to any extinction. I believe in the sanctity of change.

But it is so good to be humanly biased! I would rather lose whales and caribou than libraries.

Having said that—while intermittently reading Allan Bloom [1]—I asked myself, like he, whether my "old Great Books conviction" was correct. I don't believe in absolute and universal moral truth and patently correct convictions, but there must be a simple reason why I used to revere old Great Books of humanities, far outside natural sciences, without pragmatic value, instant gratification, and often beyond my full understanding.

The answer came quite shocking: because since the age of five or six, when I had learned to read, they were within the reach, at my fingertips, like the keyboard fifty years later. They were the intoxicating Everything on tap, free of charge. Other pleasures of life were more remote and they could not compete with books. I simply took the path of least resistance.

Reading Allan Bloom, I think about the futility of the noblest lament over the change, loss, and extinction. Civilization evolves irreversibly, and whatever happens with a large number of people, happens for simple and profound reasons that cannot be amended and reversed, but can be understood.

NOTES:

[1]: Allan Bloom, *The Closing of the American Mind,* 1987. New York: Simon and Schuster, p. 51.

2. If language, ideally, names one thing with one name, mathematics, according to Henry Poincaré, names many things with one name.

3. I thought I had made up the word dematerialization but there are 8000 links to it, many esoteric.
The above link is great, but I am afraid it will disappear soon. Here is the reference: *Daedalus* 125(3):171-198 (Summer 1996) . Also in: *Technological Trajectories and the Human Environment*. 1997, Pp. 135-156. Washington, DC: National Academy Press.

2001

Essay 19. On Reading Across the Lines

[Plato, Allan Bloom, analogy, sciences-humanities rift, Aristotle, Karl Marx, Soviet Communism, Russia, C. P. Snow]

I have a great advantage over people born and educated in America: I am neither. I have a privilege of discovering America at an age when I can fully savor and appreciate the intellectual gifts of the land, which the natives themselves, as well as younger newcomers, either take for granted or do not notice at all. Among them are a few books, long past their prime of fame, that can still stir up a storm in my head. The storm comes and goes, changing nothing in my life, but it leaves a record, like memories of a stormy romance of younger years or like an extraordinary hurricane in the annals of meteorology.

Having come in America in 1987, I missed a stimulating book published the same year: Allan Bloom, *The Closing of the American Mind: How Higher Education has Failed Democracy and Impoverished the Souls of Today's Students*. 1987. New York: Simon and Schuster. Occasionally I had seen references to it but I got hold of it no sooner than in 2001, while writing the previous Essay.

Only by the end of the book I realized that most of it was probably had come from the author's experience of 1969, when the faculty of the Cornell University was taken hostage (part *in corpore*, part in simile) by Black student extremists, who, by the way, did the same to the rest of Black students. It seems to be the case when liberal educators really got into a traffic accident of liberalism (see **Essay 16. *On Somebody Else***). They disputed, however, that the accident had happened at all, and as proof, changed the rules of the road *post factum*.

I was surprised to learn from the Web that the case had not been fully closed in over thirty years. A few links, presenting both sides, are given in the end NOTES.

The description of the events in the book reaffirmed my conviction that the Soviet Communism was simply a configuration under a more general and universal pattern of enforcing a code of behavior on a group of people under the threat of punishment. Unlike a moderate fine for littering and speeding, hardly anybody could afford to take the Soviet punishment, because it was to lose everything for life, and often the life itself.

As if not to leave any room for doubt, Allan Bloom drew a parallel between the events at Cornell and the demoralization of German universities under the Nazis. And of course, he mentioned the oppressed Soviet humanities, as well.

The pattern is so common through lands and ages that I begin to believe that no idea is bad in itself, only the extent of violent power behind it.

The author's remedy was the old Great Books: Plato, Aristotle, Shakespeare, philosophy in general, and, even more generally, the traditional liberal education based on values, i.e., distinction between good and evil. From all my life experience I conclude with certainty that natural sciences do not know this distinction. I think that this is the major cause of the rift between sciences and humanities formulated by C.P.Snow (whom Allan Bloom seemed to despise).

In Russia, I used to read between the lines. In this way I learned from *The Closing of the American Mind* that, philosophy aside, sciences and humanities stood against each other across a front line, competing for the place in the curriculum, honors, influence, and, I conjectured, money. They finally spoke the same Buckspeak language after all.

This time, however, I wanted to read across the lines.

Allan Bloom's book excited me not because I agreed with him: I had strong doubts. Besides, except for a few observations, I knew too little about American education. The subject of reading, however, resonated in me very strongly. I never lost interest in education, my credo of which is simple: education gives the map of knowledge, the rules of the road, and driving skills.

First of all, I had to read Bloom's beloved Plato.

I read Plato before, but never the entire *Republic*. I have read it in the lively, witty translation by W.D.H. Rouse (not on the Web) in which some Socrates' monologues sound with Shakespearean colorful intensity (the order of comparison, of course, should be reversed).

Republic came as a revelation. Unexpectedly, it brought me back to my childhood and youth and onward to my lifelong dream about of the bridge between sciences and humanities.

Concerning Plato, I made two personal discoveries (they might have been already made by somebody else).

I will start with the one that would take less time to explain: the evolutionary origin of the rift between sciences and humanities.

Plato was the exact triple point of divergence, right at the fork in the road, where sciences and humanities did not yet differentiate. Plato's unstable unity, transcending into duality, resulted from his reasoning by analogies. That was quite natural since the formal logic had not yet been created by Plato's disciple Aristotle. Analogy is what can couple everything, but it is not an appropriate cement for building science. The logic of Plato was bad, his syllogisms weak, and Aristotle himself acknowledged that later. Plato's

Socrates did his tricks without exact definitions, mixing the degrees of abstraction and using the same word in a wide and narrow meaning in the same quasi-syllogism.

For example (Book VI)

> "Are they [those who define pleasure as good] not equally compelled to admit that there are evil pleasures?"
> "Undoubtedly.
> "It follows that they admit the same things to be both good and evil; isn't that true?"
> "Of course."

In my humble opinion, all pleasures are good as experienced sensations, but some are evil as deeds and by their consequences, so that there is no controversy. But *Republic* is not just a Hermaphrodite of sciences and humanities, it wears a few pieces of clothing from a theatrical wardrobe.

Reading Plato, I could almost feel Aristotle's hidden disgust when he was listening to Plato's poetic images ascribed to Socrates. Aristotle by his nature, it seems to me, was more like a modern natural scientist, little concerned with politics, poetry, and events of the Cornell type. Aristotle had created the apparatus of formal logic, which is still humming in our heads and computers without a glitch, unless we lose guard, and that was an ax that hacked science out of Plato. Aristotle's logic was for science like the rules of antiseptics for surgery.

The remaining half of Plato was about values and the humanities grew from it.

Humanities are not about Aristotelian logic and sciences are not about values. This is the nature of the rift. If there is anything capable to bridge it, it is still the old Platonic **analogy**, abandoned today by all serious, reasonable, positive, and professionally successful people. A few still use it not so much for creating knowledge as for mapping it and flying instead of crawling. This returns me to my pet topic, my *dada*, and I'd better stop here.

My second discovery was that I was born and educated in the Platonic almost-*Perfect State*.

If Russia has any reason to demand compensation for Communism, it is from Greece. It was the liberal education based on Plato that infected both Marx and Lenin in their youth. But Plato infected, one way or another, all educated people in the West, until "*Higher Education has Failed Democracy and Impoverished the Souls of Today's Students*" in America.

In the Soviet Union where I was born and grew up, Plato was followed up to the letter:

1. Literature was censored:

"Then first, as it seems, we must set up a censorship over the fable-makers, and approve any good fable they make, and disapprove the bad;..." (Book II)

2. An image of unity of leadership was maintained at the expense of the truth:

> "And he [young man] must never hear at all that gods war against gods and plot and fight (for that is not true either), if our future guardians of the city are to believe it a very ugly thing to take offense among themselves easily." (Book II)

3. The God (Stalin) was installed and arts were instructed how to properly portray Him:

> "You agree, then," said I, "that this is the second shape [that 'God is simple and true in word and deed, and neither changes himself nor deceives others'] in which to tell stories and make poetry about gods; that they are not wizards who change their forms, and they do not mislead us by falsehood in word or deed?" (Book II)

4. Unconditional and masochistic endurance among hardships was taught—and practiced—as a foremost value:

> "But deeds of endurance against everything—when such things are spoken or done by famous men, these they [young men] ought to see and to hear; for example:
> Striking his breast he thus reproached his heart-
> Endure, my heart! much worse you have endured!"
> (Book III)

5. Writers were told what and how to write:

> "They [poets and storytellers] declare that many men are happy though unjust, and wretched although just; that injustice is profitable, if not found out, and justice good for others but plain loss for oneself. Such things we will forbid them to say, and command them to sing and to fable the opposite, don't you agree with ?" (Book III)
> NOTE that the Platonic idea of justice is when everybody does his own business, not interfering with the work of others.

6. Foreign influence was warded off :

> "Don't you think it an ugly thing and a great proof of bad education to have to make use of justice imported from foreigners and let them be

> your masters and judges, for lack of the home-grown product?" (Book III)

7. Innovations in art was denounced as formalism:

> "They [the overseers of the city] must guard it [training and education] beyond everything and allow no innovation in gymnastic and music against the established order, but guard it with all possible care;..." (Book IV)

8. Change of profession was made practically impossible:

> "Well, we forbade the shoemaker to try to be a farmer or weaver or builder; he was to make shoes, that the work of shoemaking might be properly done for us. (Book II)

9. Composers and poets were punished for pessimism:

> "However, we said we did not want dirges and lamentations also among the words [i.e., song lyrics]."
> "I don' know the scales," I said, "but leave the particular scale which could suitably imitate the notes and tones of a brave man in warlike action and in all violent doings..." "And leave another for the works of peace without violence..." (Book III)

> NOTE: Dmitri Shostakovich was criticized for formalism in the 40's. In 1954 he wrote quintessentially Platonic and bombastic "*Festive Overture*," probably, inspired by Stalin's recent death. At an old age he disposed of any Platonism in his last symphonies and quartets. Anna Akhmatova, a great poet who never was seduced by Platonism, was punished for her beautiful dirges and lamentations.

Those were only a few superficial parallels; analysis of all links of the Soviet system to Plato would take a book. They are deeper that those to Orwell. Of course, there were plenty of differences.

Here are four deepest Platonic roots of Communism:

1. Cult of order;
2. priority of the common purpose over an individual one;
3. cult of the truth, requiring, as any cult, an interpreter knowing true from false;
4. belief (Lenin's favorite) that the "right" idea in human head transforms into the "right" behavior.

The Soviet Communists were moderate Platonists, however. They wiped out private property among the masses (contrary to Plato, who suggested to take it from the leaders), but they did not go as far as to make women and children a common

possession. The Soviet system was based as much on Machiavelli as on Plato. It gives me shudders to think about a Republic of orthodox Platonists.

Paradoxically, the Communists, typical idealists themselves, denounced Plato for philosophical idealism and barred him from the Communist Pantheon. Also, he was too antidemocratic for the Socialist Democracy.

The question is why history has not (yet) confirmed Plato's prediction about degeneration of democracy into tyranny. Ironically, it was Karl Marx, on whose ideas the Soviet Platolandia was founded, who once and forever prophetically put the finger on the true nature of Things: it is the unknown in times of Plato production of Things by Things that made possible a new structure of productive society and liberal democracy with it, with all its blessed vices, comfortable value-free culture, successful narrow-minded scientists, bright critics and dull apologists, hallowed tyranny of money, but no personal tyranny, where everybody is his or her own tyrant or somebody who dreams of being one. The Things were ignored not only but Plato but also by Aristotle who was much more interested in animals.

Some other passages seem written today:

> "Teacher fears pupil in such state of things [democracy], and plays the toady; pupils despise their teachers and tutors, and in general, the young imitate their elders and stand up to them in word and deed. Old men give way to the young; they are all complaisance and wriggling, and behave like young men themselves so as not to be thought disagreeable or dictatorial." (Book VIII)

There is an incomparable richness in Plato, both primeval and prophetic, and my late anger is misaddressed. *Republic* is a unique and monumental creation of human mind. It is crafted so artfully that it can easily be disassembled into thousand building blocks. Some of them can be negated, others added, and the entire pile can be reassembled into thousands of new structures. Plato is the Lego of philosophers. Generations of philosophers personalized the game and added a lot of new curious pieces to it, like ANGST made in Germany and NAUSEA made in France. Finally, DECONSTRUCTION , the term reeking of Lego, aimed at becoming the only apocalyptic game in town.

What became clear to me after reading Plato was how dangerous and tragic a quest for the truth could be when books mate with life. The moral truth is what you believe in, nothing more (a statement Allan Bloom is vehemently opposed to). The truth of a philosopher-king, once implemented, can be as murderous as *Mein Kampf*.

So much for philosophy. What about reading?

I remember books since the age of four to five, when I could understand only the pictures.

Books for me were part of life, although I have since long differentiated between real life and books. Imaginary life is what remains if we subtract real life from the entirety of life.

By my limited observations, humans and animals in the books did something they never did in real life, or did not do what they were supposed to do. People around me would never speak like authors or characters of the books. Many words were indigenous to the books only.

In my TV-free youth, books were a separate world, maintaining twisted, like messed-up yarn, relations with reality. They offered an alternative non-Euclidean space where I could watch, travel, fly, teleport, build, destroy, and go back and forth between the two worlds. What united them was the atmosphere of language. It was the same air of the Russian language that mysteriously sustained not only myself but all the book characters in the France, England, or Germany of the books translated into Russian. They all, with all their foreign names and habits, spoke Russian in the books. Today the Russian people from the faraway past speak English in my memory.

With time I discovered that the books I read had become part of my code, as I would say today. My behavior was influenced by books, and no wonder it often either came in conflict with life or was wasted because the rules of the books were not the rules of the life around.

The influence of books was indirect and subtle. It did not provide me with any kind of imperative. It was the very stuff of thought, the ideas, concepts, notions, and terms that I could use as blocks for combining them into new configurations. The word virtue, for example, was not used in everyday speech and if I did not hear it on the radio or see in the books, I would never discover that such thing existed, the opposite of it was vice, and I would never examine any fact in terms of virtue and vice, although I could reinvent the distinction myself. There is still no Russian equivalent of the English word “privacy” and what it denotes.

The books legitimized a combination of sounds or letters as carriers of meaning. As far as they occurred in connection with other words, a web of meaningful words and statements grew in my mind.

I remember how my father took me to a flea market. It was right after the WW2 in a devastated by the war and recent German occupation city. People would sell anything for bread. The junk was laid out right on the ground. It appeared as yet another separate world, as rich as the books, and I got attracted to hardware for the rest of my life.

I saw a man fishing out some small objects with a magnet suspended on a string. The objects, less than an inch long, looked like short pieces of tubes with wires sticking at both ends. I asked my father what it was. "Resistance", he said. It was beyond my understanding because the word resistance meant a human attitude or behavior. It took several years before I learned what resistance was from a course of physics and understood that the tubes were *resistors.* Some of them, made of ferromagnetic wire,

stuck to the magnet and others, made of carbon, did not. To that I have to add that both resistance and resistor are a single word in Russian (*soprotivleniye*), with the third meaning, like in English, of underground struggle against occupants.

Around 1948, the Stalin's Russia launched a campaign against "cosmopolitanism," i.e. foreign influence. It included the purge of words of foreign origin from the Russian language and claiming Russian historical priorities in science and technology, starting from the steam engine. The French loaf was renamed "town loaf." Vienna rolls and Bologna sausage were also punished, together with poets, composers, and scientists branded as sycophants of the West. A nice illustration to Plato.

In the 70's, the foreign influence started creeping back, although the rolls and sausage still were part of "resistance" to the West. I saw, however, the English *resistor* sneaking into Russian, and now it is the primary Russian translation of the English word in an online dictionary . Only in the 80's, however, when I discovered uncensored Judaism, it occurred to me that the core meaning of cosmopolitanism in the newspeak of 1948-49 was "the Jews." More informed people got it right in an instant.

As an outstanding Polish writer Stanislaw Jerzy Lec (1909-1962) said: "The window on the world can be blocked out by a newspaper." (see some other aphorisms of Lec, of which my favorite is: *I prefer the sign NO ENTRY to the one that says NO EXIT*). By the same token, education can obscure the world view, and that was apparently another reason for Alan Bloom's anger.

I am rambling through my childhood memories (something I do only once in a blue moon) in order to illustrate what books and education in general can do for a person. It is the same as to supply a cobbler with leather and a carpenter with wood. Books contain the very substance of intellect, the knowledge in the form of blocks (generators) and links (bond couples) between them. Books are assembled constructs of a Lego, but they can be disassembled and rebuild into new constructs. The properties of language make big jumps possible, like from electric resistance to underground resistance, and one can fly through the huge space of ideas and images, not just crawl.

I deny, however, that the Book is a Holy Grail of truth, except for a believer.

The books can also supply the cobbler with wood and the carpenter with leather, for which neither one can have any use. (Reminder: I am a believer in useless things).

The manuals and textbooks in science and technology provide positive, stable, and useful knowledge. The old Great Books provide a wonderful, mostly useless, junk to be recycled, rearranged, reassembled, and used for new devices like the old resistors fished out among the misery of the post-war city. I want to believe now that somebody needed them to build a radio (all short wave radios had been confiscated in 1941, when the war started) and listen to the BBC in Russian.

Under Plato's guidance, I can design pieces of Socratic dialogue:

> "Are you saying, Thrasymachus, that the books are always useful? Would that be of any use to supply a carpenter with leather?"
> "Least of all."
> "Then, if there is a book on making shoes, would it be of any use for a carpenter?"
> "Not at all."

Or:

> "Are you saying, Thrasymachus, that the books are of no use? Wouldn't that be useful to supply a carpenter with wood?" etc.

Or:

> "Are you saying, Glaucon, that the books on virtue are of no use for either a carpenter or a cobbler? What if they had to defend Athens against the assault of barbarians?" etc.

Allan Bloom believed that the neglect of classical liberal education was at the root of all problems. Education failed democracy. Why, then, the books and education of a totalitarian state supplied me with bricks to build my generally liberal Western mentality? How could I acquire the modern democratic mentality in totalitarian Russia?

Throughout my childhood and youth, fiction, biographies, popular science, and adventures made up my reading list.

Books of independent authors in social sciences and humanities in general were not available in USSR. An exception was made for pre-Marxist philosophy, but not for anybody who was criticized by Marx or Lenin as reactionary. I could not ask for the Bible in the city library, but Hegel, Kant, Fichte, and Schelling were available in old editions. Saint-Simon, Thomas More, Robert Owen, Tommaso Campanella, Charles Fourier, and other utopians were all translated and nicely published as predecessors of Communism. It was the anti-utopias of Aldous Huxley and George Orwell that were forbidden. Plato, denounced as reactionary idealist, was available in old editions and later even re-published.

Never having seen the Bible, I knew all about the commandments and accepted them all but the first. Moreover, the official Soviet ethics differed little from the ethics of Plato. Freedom, pursuit of happiness, hard work, loyalty to the elected government, the primate of common good were all both Soviet and Platonic values.

A Soviet counterpart of Allan Bloom could have justly said that the Soviet education failed totalitarianism. But as democracy was strong enough in the USA with the failing

liberal education, totalitarianism was strong enough in Russia with the failing totalitarian education.

As I have already stated, education for me is neither sciences, nor humanities, but a map of knowledge. Thus, the student can be lost, but education cannot fail. It is a part of initiation, an introduction into life, but not the life itself.

Books and life are different things. If there is a discord between them, people look for a different life or different books.

Democracy is not a choice, it is a result. So was the totalitarian Republic in Russia. So was the American Revolution. So will be any big social turn. It is presumed that democracy persists because people vote for democracy, but people do it for their own reasons, and the reasons may change, as it happened in Germany, the land of philosophers, in 1933. Student extremists in America may have their reasons, liberal students in China may have theirs. If such brilliant people as Plato, Nietzsche, Allan Bloom, and Francis Fukuyama had some reservations about democracy, an average voter can have them, too, if the weather changes. The Lego pieces marked Autocracy, Aristocracy, Dictatorship, Oligarchy, and even Anarchy and Communism are all in the game, but, unlike in the times of Plato, discourse is not a pastime of friends but a competition. The truths compete in the marketplace of ideas, with attached price tags.

On the map of knowledge, analogies are highways to understanding, the fastest routes from point to point. Analogy does not prove anything, but the analogy between all complex competitive systems points to a possible direction for the search for answers. Like Plato's logically weak dialectics, it stimulates imagination and generates hypotheses.

The following passage in Allan Bloom's dialectics stimulated my imagination:

> I suspect that if we were to make a law forbidding the use of any of the words on the imposing list in this section, a large part of the population would be silenced. Technical discourse would continue; but all that concerns right and wrong, happiness, the way we ought to live, would become quite difficult to express. These words are there where thoughts should be, and their disappearance would reveal the void. The exercise would be an excellent one, for it might start people thinking about what they really believe, about what lies behind the formulas (page 238).

Having no company, I asked myself a Socratic, and therefore potentially offensive, question:

> What if the Old Great Books, including Plato, suddenly disappeared, together with all the references to it? Would we lose anything? Notice their absence? Find ourselves in moral darkness? Would productivity drop? Real estate go up or down? Would we kill the neighbor?"

This is a question that can be asked about any great book, including the Bible. The Christians would not necessarily be all converted into Islam or Buddhism as the largest

alternatives to Christianity. Neither they would all become pagans or atheists. I believe that the Christian ideas could be largely reconstructed from the remaining literature, history, artifacts, and even reinvented by mutation of existing religions, although not in exactly the same form.

This is pure fantasy, a thought experiment, and it is what I like most about books. The function of the old and new Great Books is to heat up the mind, melt it, and not to cast it into a standard mold. The educator cannot be responsible for the bizarre shapes the liquid takes when it cools down, especially, if there is no mold at all.

The above experiment was in fact conducted in the Soviet Union where the Bible could not be obtained even in a large library without a special permission given only to Marxist lecturers, and local libraries did not have it at all.

I first held the entire Bible in my hands only at the age of forty. It was never to be found without a hard effort. The Bible had disappeared from the Soviet life, but its genes were alive in the classical Russian literature. The Soviet book editors usually supplied books, especially, older or translated ones, with extensive notes and commentaries. Uncommon names and words were also often explained in footnotes, so that I could learn something about Judaism even without the Torah.

My hypothesis is that the ideas of the extinct Plato would regenerate in some primitive forms and then reassemble themselves, like the androids of sci-fi movies that can melt into a mercury-like liquid and then grow from it back to shape.

The language is the mercurial liquid. It contains most words used by Plato, except maybe proper names. But to bring the shapeless mercury into a shape we would need a source of order.

My other hypothesis is that metaphor and analogy could be a source of order. Like scientific terminology, which now surpasses common language in volume, was created mostly from the words of common language, live or dead, by analogy or metaphor, the reverse process, in the absence of humanities, could create something comparable to Plato's *Dialogues* by analogy or metaphor referring to scientific terminology.

Plato reminds me of stem cells, the buzz of the day. Plato split in two when sciences and humanities grew from his method in *Dialogues* as two different tissues. A second division, in a different plane, happened with his political ideas. Communism and Socialism formed a tissue from his idea of common good, while the ultimate individualism of American society can be traced to his idea of justice as non-interference in each other's business.

Starting with Plato, I had to move to Aristotle. His *Nichomachean Ethics* is already a different world, stern and cool, but beautifully rational after beautifully contradictory and controversial Plato. I was not able to find any inconsistency in Aristotle. His *Organon*, familiar to me since high school, shines with white enamel, chrome and nickel of a

modern laboratory where thoughts of all breeds are kept in cages by hundreds and dissected like rats.

What I found in *Nichomachean Ethics* was my favorite idea of the split between life and books. Aristotle recurs to it throughout the entire book. Life is life and books are books, and they **complement** each other. In the end, he notes:

> "Even medical men do not seem to be made by a study of textbooks."

Reading Aristotle I felt myself not a skeptical, suspicious, tired, absentminded, and disillusioned old man but a shy overweight teenager listening in awe to Simon Vool (Semyon Moiseyevich Vul, as his Russian-Jewish name was), an eccentric teacher of logic in Stalinist Russia of 1952, swarthy, with dark piercing eyes, high brow, receding unkempt hair, in white canvas suit, who was telling us, thirty boys of the ninth grade, about Aristotle, chanting "*Barbara, Celarent, Darii, Ferioque prioris* ..., " the Medieval memory aid of correct syllogisms.

Well over the hill of my life, I hear Aristotle giving me in the quick raspy voice of Simon Vool the last vindication: **the contemplative life is the happiest**.

I found a contradiction even in Aristotle, didn't I?

Life is life and books are books, and never the twain shall meet ... except in poetry, from which I paraphrased a line :

> ***Oh, East is East, and West is West, and never the twain shall meet,***
> ***Till Earth and Sky stand presently at God's great Judgment Seat;***
> ***But there is neither East nor West, Border, nor Breed, nor Birth,***
> ***When two strong men stand face to face, though they come from***
> ***the ends of the earth!***
>
> (Rudyard Kipling, *The Ballad of East and West)*

Having survived the Platonic Cave, I am still not disappointed, to my own surprise, on a bad day, in the liberal democracy, with all my ANGST and all my NAUSEA, and even witnessing its turn to the next stage:

> ***When two strong Things stand face to face, though they come from***
> ***the ends of the earth!***

NOTES: On Cornell, 1969: 1 , 2 , 3 , 4 .
(Links still alive in 2009**)**

2001

Essay 20. On Artificial Art

[art, pattern, knowledge, understanding, analogy, configuration, transformation, op-art, new and different, novelty]

I am going to make a picture that may pass as art if neatly framed.

My art is not real. It is artificial. It may seem even more artful than real art. Or less. In the realm of art, a consensus on value judgments can only be posthumous.



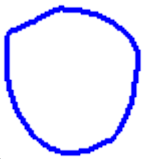
Art consists of relatively contained areas defined through periods, geography, movements, and schools (note a similarity with philosophy). One of them is Op Art. (Optical art). Here is an example: *Cherry Autumn* by Bridget Riley.

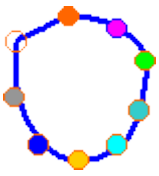


Here is a big name in abstract art: *Orange and Yellow* by Mark Rothko.

In my technique I am completely limited by the functions of the drawing software. Instead of brush and paint, I use Microsoft Draw from Office 2000, Windows 98.

I start with a closed curve built on 9 points:

Curve 1 

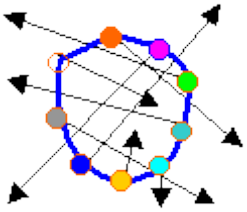
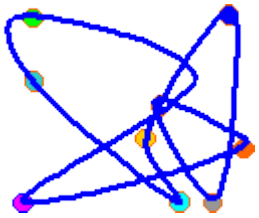
Selected points 

I can edit the curve by moving the points. When I move the points, they drag a part of the curve with them. What I want to preserve is:

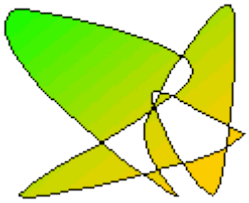
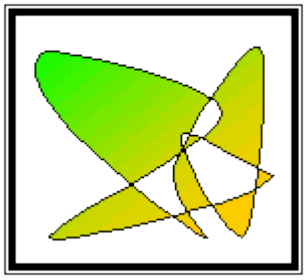
1. The curve is closed.
2. The number of editing points is 9.
3. The curve remains "smooth," i.e., it does not show sharp angles and does not kink.

The rest—position in the plane, size, color, fill, etc., (the Draw has a lot of nice functions)—will remain unchanged.

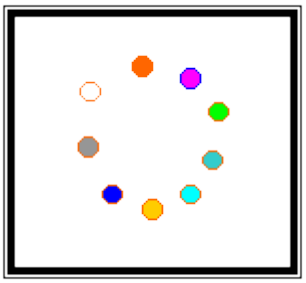
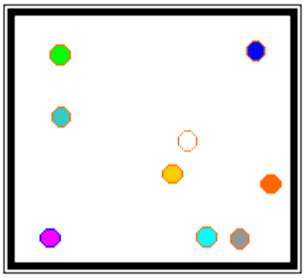
Next, I am going to edit points by moving them along the arrows. I call this change Transformation 1. It will define a new Curve 2.

Transformation 1:  Curve 2: 

Next, I will apply a two-color fill  and get Result 1.

Result 1  I frame it into Picture 1 

I can frame some intermediate results of my work on Picture 1: points of the Curve 1 and Curve 2, which I will call (because the frame makes the picture) Picture 2 and Picture 3:

Picture 2  Picture 3 

In these two pictures I do not show the curve. The "full-filled" pictures consisting of closed filled curves can be called realistic, as if we lived in a world populated by closed curves.

Picture 2 can be called impressionist. It contains some elements of Curve 1 —points—in a stylized and exaggerated form of colored circles. Still, it clearly hints to Curve 1.

By making small incremental changes in the positions of the points, either one by one, or several at once, I can produce an infinite series of realistic curvaceous Rubensean pictures or equally large collections of their "impressionist" derivatives.

Picture 3 completely breaks away with realism and portrays points for their own sake, so that the curve behind the points is left to the viewer's imagination. If most viewers could agree on connecting the points of Picture 2, they would sharply disagree regarding Picture 3. For some of them there would be no reason why the points should be connected by a single closed curve, and they would connect them like stars in constellations.

I would say that Picture 3 is truly abstract. But still, there is a weak connection to reality: nine coins on a table could inspire a picture like that and I could give it a title: *Nine coins*. This is a property of art: to revoke something outside the picture.

The relationship between art and reality is analogous to ...analogy.

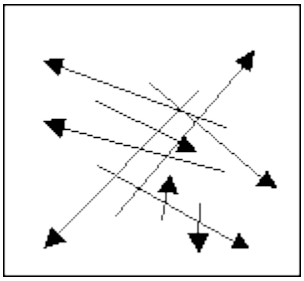
The three pictures, therefore, represent three indefinitely large families of pictures: filled curves, points that unambiguously suggest curves, and points that suggest either a multitude of connections by closed curves and/or open lines or a complete disconnectedness (I could call Picture 2 *No exit* and Picture 3 *Solitude*). These families are patterns.

While whole libraries are written on art and artists, describing their style, mutual evolutionary relations, and various idiosyncrasies, each of my styles (and, I believe, any modern style) is defined in a very precise way by:

1. Lego of building blocks (**generators**). It is stored in the Draw software. It consists of points, lines, fills, and transitions from one to another.

2. Rules of regularity of connections that tell which combinations of generators (**configurations**) are allowed and which are out of whack. For example, the rules may state that only single closed curves are regular, although a huge variety of other pictures can be created from the same generators .

3. Similarity **transformation** of one picture into another (point editing, color and fill change), that preserves some properties, for example, property of being a closed curve or a set of points, so that all pictures within the pattern are similar. Technically, the transformation here is a multitude of arrows. →



NOTE: Such transformations are mathematically described in terms of group theory.

4. **Frame.** Without a frame, it is not a picture and no one will buy it.

The four aspects define a pattern. If we compare pictures 2 and 3, considering picture 2 regular, we may say that picture 3 is irregular (the reverse may not be true). We can, however, consider a different pattern where both are regular.

The picture by Bridget Riley is a spectrum-like series of thin vertical colored lines. (More by Bridget Riley). Riley was among the founders of Op Art and her striking pictures of the 60's seem to anticipate computer drawing.

The picture by Mark Rothko is a configuration of a pattern that can be described as vertically arranged, approximately rectangular, mostly monochrome areas against a monochrome background. An infinite amount of such pictures can be produced. In fact, the number is usually limited because the art is a product for sale and mass production brings down price and is subjected to the whim of the market. Mark Rothko came to his signature pattern only after a personal evolution as painter. It is his pattern evolution that makes him an interesting painter.

Pictures by Rembrandt show human faces and figures. Remarkably, it is very difficult to describe Rembrandt's pattern, but his paintings are impossible to be mixed with anybody else's. Their description would involve such words as humanism, compassion, depth, artistry, drama, tragedy, passion, richness, psychology, etc. He went through a dramatic evolution in his life and painting.

No doubt, significant part of Rembrandt's complexity can be attributed to the content, model, nature, and the artist's personality and life. To separate the technique from the content is a difficult task, however.

Abstract art is light on content or almost (but never completely) free of it. Even Rothko's colored spots show an emotional evolution akin to that of Rembrandt. Art is even more about life and death than philosophy.

Rembrandt is my favorite artist. His effect on me is comparable with that of music. But I take modern art seriously, too. I like everything innovative, original, and dramatic in form and I do not expect much content from modern art.

I like Rene Magritte (another his site) , Dali, and Clayton Anderson. This trio, as I now realize, answers my life long attraction to fantasy, mystery, and fairy tale. It was the mystery of transformations that attracted me to chemistry at the age of 14.

I like intellectual and emotional components in painting. I don't like cubism and its heirs. It is too plain, even vulgar. Modern art, as a whole, completely lacks compassion and in cubism the void overflows into misanthropy.

I believe that after the Copyright Act of 1976 the borderline between art and commerce does not exist . This is especially true about visual arts, which are collectibles and a form of investment.

My previous explanations and demonstrations are themselves a pattern. When an author of a study discusses a painter (or any artist, writer, composer, etc.), the following aspects are commonly noted:

1. Classification by geography, time, school. Belonging to a family of similar painters.
2. Traditional components of picture: perspective, color palette, chiaroscuro, drawing, composition, texture, genre, etc.
3. Typical content, if any.
4. Relation to natural objects and their deformation. Is painting similar to nature?
5. Innovations in methods and materials.
6. Connection to other painters and influences on the posterior ones.
7. Impact on viewers. Sales.
8. Artist's biography, credo, loyalties, transgressions, and perception by critics.

All pictures within a pattern are **different**, but not exactly new. The very first few pictures of previously unknown pattern are **new**. The subsequent ones are different.

A new pattern involves a change of blocks, rules, or transformations. If those changes are big, the pattern is radically new.

This is how art evolves, but as we can see, there is nothing dramatically specific of art except its relationship to model. The same happens with science, society, religion, technology, institutions, everything that evolves, and, therefore, the Everything. It evolves through the NEW and the DIFFERENT.

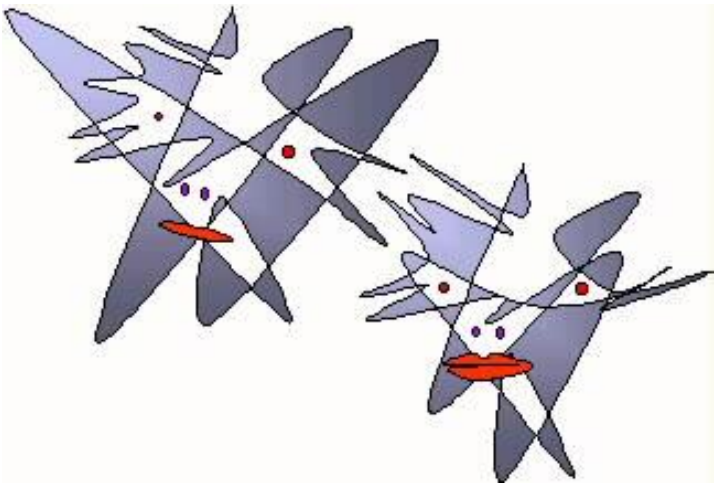
Instead of relationship to model and nature, there can be a relationship to laws, customs, principles, astrology, numbers, and other sources of order.



<= My Picture 4 falls into the same pattern as Picture 1. The only innovation is that it consists not of one but of 8 closed and filled curves. But we did not set the number of curves as a rule of regularity. This is quite a different picture because it is influenced by a model: it is similar to the ancient theater masks. **This is the ordering effect of analogy that I discussed in Essay 19. On Reading Across the Lines .**



By applying the same technique, I made the following picture:



Yuri Tarnopolsky. Couple. 2001.

Unfortunately, I cannot afford a good frame, and so this is not really art. Let's call it a study in similarity.

I hope this Essay demonstrates the difference between knowledge and understanding. Knowledge can be true or not if checked against reality. Scientific knowledge must not contradict experiment. Knowledge in humanities must not contradict sources, observations, and, if possible, experiments. Knowledge of technology is judged by the successful production.

I perceive original philosophy as art that uses ideas as building material. Not accidentally, every philosopher since Kant invents his own vocabulary like an artist who introduces a new technique. Philosophers influence each other like artists and form school, but for them to speak a common language would be a disaster, like two ladies wearing the same dress at a party.

Understanding (which, as I believe, is the primary goal of college education), gives the structure of knowledge in a certain area, i.e., the map of knowledge. Thus, the above 8 (or more) aspects of art are such a map, a pattern that can be filled up with different knowledge, true or false, about different artists, with gaps or extras. Understanding is a framework, a pattern.

We may never have a chance to visit New Zealand or Ecuador, but the map tells us about their existence as nations, and we expect them to have detailed maps, economy, history, culture, and local food.

To get basic understanding of art means to learn components of art and their mutual relation, the general pattern of art, and go through a couple of examples.

To know art (never completely), one must devote a significant part of life to studying art. The same is true about chemistry and anything else, even the mating habits of crickets. To understand chemistry could take a couple of months. To learn it would take a couple of lives.

Plato and Aristotle created the first Western comprehensive map of knowledge, not necessarily true from our point of view. Since that time, the map has been in the process of expansion and correction (see **Essay 19. *On Reading Across the Lines***).

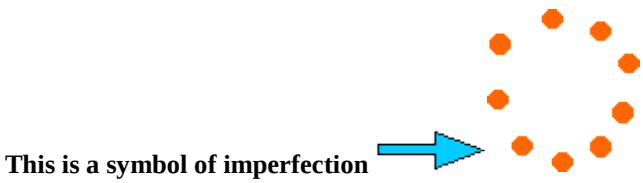
Art is one of a few things that cannot be false. Whether it is always true is questionable, but in a different sense. In nature and art we find a sweet breather from the daily fretting over "true or false?"

High art invents patterns. Low art invents configurations.

High art transforms the viewer. Popular art transforms the artist.

I have always been deeply intrigued by the mystery of the transformation of art between the nineteenth and twentieth centuries, starting with the impressionists and up to Marcel Duchamp, Robert Rauschenberg, and Andy Warhol.

Today, when I am guided by the idea of the evolution of Things against the stability of human nature, I believe that fine arts and literature felt the coming changes. They could be heard as we the hollow rumble of the train coming from afar with an ear pressed to the rail. It is not accidentally that pop art coincided with the time of the great explosion of the Things in the 60's (see **Essay 4. *On New Overcoats***). Looking back on the development of art, I see the modern art as the art of Things.



NOTES:

1. The online Picasso Project is a wonderful illustration to the above, including the transformation on the main page.

2. My pattern ideas are borrowed from Pattern Theory of Ulf Grenander: Ulf Grenander, *Elements of Pattern Theory*, Baltimore and London: Johns Hopkins University Press, 1996.

2001

P.S. (2016) After 15 years, I came back to art in my concluding Essay 60, Art and Nexistence. It is also included in Last Essays.

Essay 21. On Ethics

[ethics, Albert Schweitzer, Niels Bohr, understanding]

Here, following **Essay 20**, I would like to summarize my previous twenty Essays.

In **Essay 3** I noted that Montaigne designed *Essays* as a tool of understanding. His *Essays* included a large part of the contemporaneous map of knowledge (and fragments of the knowledge itself) that was mostly based on the authors of classic antiquity. His introspection, however, expanded the continent of human nature and daily hum of human body almost up to the literature of the nineteenth century.

I believe that Montaigne, widely read in all European countries, including Russia, was one of the precursors of the European novel of morals and manners.

Montaigne wanted to understand himself, following one of the commandments of the Antiquity : "know thyself," attributed to various sources, including Thales of Miletus.

Writing these Essays I have come—jumped, rather—to a conclusion that self-understanding is not as difficult as Thales of Miletus was said to believe. It comes automatically with age. We are embedded in the network of relationships, receive signals, send our own signals, think, and act. The way we do it is what we are.
To understand ourselves as humans, our **collective** past, and possible future is more difficult because it means to understand Everything. We, as a species, interact not with individuals but with Everything, are born by it, know it, and will dissolve in it. What is not linked to anything does not exist.

Understanding is not only the road map of what we know but also the edges of the map beyond which we cannot go: the laws of impossibility, like the laws of thermodynamics, competition, and selection that adamantly oppose our equally stubborn liberal ethics, including the Albert Schweitzer's **reverence for life**. The very fact that the tug of war still goes on (example: the European attitude to death penalty) makes this life bearable. It does not make it either good or bad.

If I had to offer a single ethical principle, I would repeat what I said several times in these Essays:

> ***No idea is good or bad on its own. Any idea is evil if there is an unopposed violent force behind it. Any idea is good if there is a skeptical opposition.***

The most productive reverence we can possibly have is reverence for Niels Bohr. I would half-seriously paraphrase his view as: "no single ethical principle exists."

If so, we have a coupled principle, not quite symmetrical to the first:

> ***One has to stand for his or her own idea with utmost energy and conviction, as if it had a proof of goodness, and one should not be outright skeptical to any other idea.***

Every deep idea is shallow, however, because most people act out of their deepest instincts in the basement of the soul that preclude ideas in the mind's loft. As far as the ethics of action is concerned, I am rather a traditionalist.

To be wise in the spirit of Montaigne is to be both skeptical and tolerant. Including toward yourself, I would add.

It was from Montaigne that I learned to be skeptical of propaganda and authority. It took my entire life to become tolerant to myself.

2001

P.S. (2016). In other words, what is not disputed by somebody, is neither right nor wrong.

Essay 22. On Errors

[errors, Graham Greene, QWERTY, Dvorak, Sigmund Freud, Freudian slip, parapraxes, genetics, Confucius, topology, metrics]

T*he Comedians* by Graham Green is one of my most favorite books.

Three completely different men are packed as passengers into a narrow space of a cargo ship going to the Haiti of Papa Doc Duvalier: the saint, the rogue, and the narrator who is coming back to his tepid love affair with a woman who had once pulled him into the orbit of her marital desperation, as well as back to his stronger attraction in the form of a real estate possession.

The passengers are spilled out into the billiard pool of the Caribbean island “of fear and frustration” where they can hardly find any other "fellow white man, one of the slaver's race." The human billiard balls collide with the rails of the table, as well as with each other, and fall into the pockets under violent blows of the cue.

The billiard ball is a flawed metaphor: it emphasizes individualism of humans and their compliance with external forces but obscures their ability to be pulled together and form bonds, as well as challenge the environment and each other. As objects capable of attraction, repulsion, and independence, humans are primary and unparalleled components of the world. Unparalleled—except by molecules.

Faithful to the chemistry of human nature, Graham Greene draws the lines of attraction between the balls. The strength and sign of the bonds vary from suspicion to indifference to love. Greene avoids hate, although, unlike one of his fellow travelers, a provincial American preacher of vegetarianism who thinks "in terms of Mankind, Justice, the Pursuit of Happiness," (the saint) he sees enough reasons for it in the world.

In the fine plot only an unbreakable marital bond and a broken one are clear from the start and they stay so to the end. Other bonds form, fall apart, and oscillate. Greene draws a dynamic sequence of structures, including one real and one imaginary triangles, with a high art of taut storytelling, using understatement, echoing repetitions, and hints to weave his artistically calculated web. With a transparent symbolism, only the woman in the focus of the novel, who is always natural and does not play a part, is given the first name: Martha. The three comedians do not have them.

The narrator, skeptical up to cynicism, seems unable to have strong attraction to anything but his property, and yet he constantly and compassionately shares the entanglement with

other people who are driven by more energetic impulses. The compressed space of action simply does not allow for any indifference. Driven by jealousy, he makes a tragic error that costs the likable rogue his life. In the end, he comes out of the game with no bonds left at all. For that matter, the saint and the rogue had made their errors, too.

It was not geometry, however, that fascinated me when I read *The Comedians* for the first time, soon after the book had been published and reached Russia. At that time I was entangled in a web of my own making. I saw in the book the drama of an accidental spark between a man and a woman that can irreversibly destroy the previous life. I was shocked by the discovery of "a point of no return unremarked at the time" in my own life. Graham Greene insisted that such points were part of human nature. I suddenly realized that my fate had the Olympian power over me, but the Olympus was, probably, some small bump in my brain.

Greene chose a quotation from Joseph Conrad as an epigraph to his later novel *The Human Factor* (1978), even more applicable to *The Comedians*: "I only know that he who forms a tie is lost. The germ of corruption has entered into his soul."

In the Soviet version of the Platonic Republic (see **Essay 19**) I believed in the stability of life based on work. I learned, however, that the quiet order of things could be grossly violated locally, in a close contact with another human being, within a narrow space, causing the catastrophic long range effects—the **pattern** well known to physicists studying crystal dislocations, (a beautiful chapter of physics) as well as statesmen, generals, and oncologists. I had formed a tie and was lost.

> **NOTE**. The dislocation physics of solids is full of human symbolism. It says that perfect crystals should be very strong, but they do not exist. The weak imperfect crystals could be made stronger by making them even less perfect through additives and turning into alloys. The dislocation can be compared with the teeth of the zipper right under the moving slide.

Much later I was destined to learn the meaning of "fear and frustration" coming from not personal but historical point of no return.

The Classic Greek tragedy was about impossibility to fight fate. The Western literature of the nineteenth century was about the rise and fall of an individual wrestling with the fate. The new wave of the twentieth century, from modernists to Ayn Rand, annulled fate. Graham Greene, never with the crowd, equaled fate with accident, as any writer of page turners always did, but he encapsulated the character in a shell waiting to be cracked by an accident so that the hero could look inside himself and see that the cynicism was just a shell.

The ties with other people, whether attraction or repulsion, limit our personal freedom. The loss of ties, loyalty, and moral distinctions is what we pay for the anti-Platonic chaos of freedom. The ability to make such ties distinguishes us from billiard balls. Too much bonding—and we are simply parts of a mechanism, ball bearings, slaves, and tools. No ties—and we are atoms in the void. A very few very strong ties is my image of the home of a traveler and the anchor of his ship.

I read *The Comedians* countless number of times, always discovering new shades and details in his idealistic version of human chemistry. I was coming back to his other books, too.

I found another flash of geometry in Chapter 16 of Greene's *Travels with my Aunt* .

> It was getting chilly by this time, and I turned on the electric fire before opening the letter. I saw at once that it came from Miss Keene. She had bought herself a typewriter, but it was obvious that as yet she had not had much practice. Lines were unevenly placed, and her fingers had often gone astray to the wrong keys or missed a letter altogether. She had driven in, she wrote, to Koffiefontein—three hours by road—to a matinée of *Gone with the Qind* which had been revived at a cinema there. She wrote that Clark Fable was not as good as she remembered him. How typical it was of her gentleness, and perhaps even of her sense of defeat, that she had not troubled to correct her errors. Perhaps it would have seemed to her like disguising a fault. "Once a week," she wrote, "my cousin drives into the bak. She's on very good terms with the manger, but he is not a real friend as you always were to my father and me. I miss very much St. John's Church and the vicar's sermons. The only church near here is Dutch Deformed, and I don't like it at all." She had corrected Deformed. She may have thought that otherwise I might take it for an unkindness. (Graham Greene, *Travels with my Aunt*)

The above excerpt also demonstrates Greene's style of placing the tip of an iceberg among the apparently meaningless verbal waves and giving us at least two snapshots of it ("...her gentleness" — "...otherwise I might take it for unkindness"). One can draw a straight line between two points, distinguishing typical from accidental. The line, however, is invisible in the text, not straight, and the reader has to be attentive. It goes sometimes through several pages, like a wormhole, with the points of entry and exit.

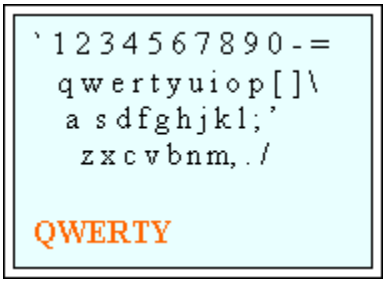
These Essays are also conspicuously interconnected by wormholes in the form of cross-references.

The errors made by Miss Keene needed the following corrections:

Qind	Wind
Fable	Gable
Bak	Bank
manger	manager
Deformed	Reformed

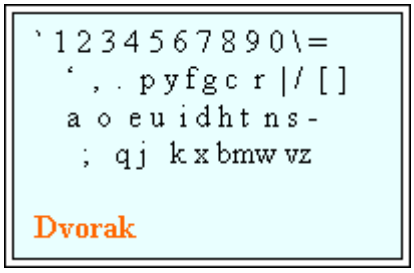
Graham Greene was a writer of fiction. The above errors could be completely fictitious. I have an evidence, however, that they were not.

This is the common typewriter layout known as QWERTY:



The typewriter keys Q and W, F and G, and D and R are neighbors and, therefore, can be mixed up easier than Q and D or F and P. It confirms that Graham Green was as realistic in this insignificant detail as he was in portraying human characters.

It turns out that there is an alternative layout called Dvorak . Dvorak and its hopeless competition with QWERTY has simulated a discussion of philosophical magnitude, concerning some most important properties of our society.



Curiously, the properties of the space we live in predict our errors.

Whatever we do, the high probability of small deviations from the goal is a law of nature. This is why our most probable errors are concentrated in a small space: the **neighborhood** of the target (see **Essay 16**). In topology, the **neighborhood** of a point is a set of all other points close to it (actually, not so simple: "A neighborhood of a point or a set is an open set that contains it": Topology glossary).

The proponents of Dvorak promise more comfort and less errors, which might be true because QWERTY is irrational. There is an opinion that the inventor of QWERTY put all the letters for the word TYPEWRITER in the upper row of letters simply for the convenience of the salesmen.

Concerning the social space, Plato promised a space with less errors by segregating the rulers from the masses. Hitler quite reasonably assumed that a larger *Lebensraum* would ease the stress of the Germans bumping into each other, but he overlooked, as Napoleon did, the simple physics of a pressure drop in an expanding volume. In Russia, the largest country on earth, Stalin, in order to prevent both the bumping and pressure drop, designed the society as the crystal lattice of a marching column, but he, too, overlooked the physics of the melting solids, as well of the brittle solids with dislocation defects).

Correcting my own typing, I constantly find that the closeness of the keys is a defining factor in making an error. In addition, because typing on the keyboard takes so little effort, I could occasionally depress two keys in the same row at once with one fonger (ha! that was an exemplary error!), for example: fd, kl, but not ok or ef.

Graham Greene's characters are realistic because their words and actions make sense. The novel runs in a linear time cut into ahort (another typing error: should be "short") pieces. Within the fragments, each couple of neighboring consecutive events is credibke (should be "credible"; well, enough to prove my point): they **stick together**.

A fiction writer takes realistic fragments of life and arranges them into credible sequences. The large sequences are combined into longer passages. The passages fit into chapters, and so the novel is crafted like a house. The difference between Graham Green and Stephen King is that the credibility of Greene covers also the joints between the larger blocks and goes up to the highest levels of the structural hierarchy, while the credibility of King ends at a much lower level where the fantastic events have no match in ordinary human experience.

Graham Green designed fictional stories that could happen because they did not contradict any known principles of nature, either physical or human. His characters and collisions could be played by real actors. King's books could be turned into movies only by using technical tricks falsifying the laws of nature and common sense.

Reality, which is a euphemism for Everything, is like a computer keyboard: it has a **topology**. This mathematical term means approximately that there is a set of objects (points of a space) and for every two objects we can tell whether they are close neighbors or not, but not much more.

A topological space can be compared to a completely dark room where we have to move from point to point, groping around for objects and planning the next move. We may not know what is in the room, but we can conclude that the curtain is close to a window and the chairs are close to the table. Through a blind walk we can even find the exit to the light from the darkness.

In addition to topology, our natural **metric** space has **distance** between every two points. Metric space is a particular case of topological space.

Metric space is like the illuminated room. We can move straight from the window to the table because we can see distance, a not just closeness, between objects.

I have just loosely interpreted two mathematical terms, topology and metrics, by presenting their metaphors. We cannot learn mathematics or any other science through metaphors but we can understand them without going into details.

Biology has some topological flare, too. At the early stages of genetics, long before molecular biology and DNA sequencing, scientists could study the position of genes in a chromosome by groping around in the dark, without even knowing what either genes or chromosomes were. They studied the topology and derived the metrics from it in the same way Confucius built his moral scales (see **Essay 13**).

> **NOTE**: Article **Genetics** in Encarta is a better source of information on this subject, mostly of historical significance, than the Web. The key words: chromosome, crossingover, recombination, Thomas Hunt Morgan.

To give a metaphor for the methods of formal genetics, it is the same as to reconstruct the keyboard layout by the statistical study of typing errors. By determinimg the most often misprints, we can tell which keys are the closest: they are mixed up most often. In this way we can build a neighborhood of each key. Similar methods are used today in the computerized analysis of long biopolymers by comparing their fragments.

Another example is biological systematics where tiger and cat are very close while cat and fish are elements apart and cat and catnip are in different universes. In a different representation of the world, however, cat is pretty close to both fish and catnip but far removed from golf ball.

> A mathematician could say that systematics is a discrete space that has a tree topology.

Literary fiction helps us understand ourselves and the world, but we have to accept a share of misunderstanding. Nothing in the world, however, can spare us of errors.

Speaking about errors, to omit Sigmund Freud would be unspeakable.

In his *Psychopathology of Everyday Life* (1901), Freud analyses errors such as forgetting of names and foreign words, mistakes in speech, reading and writing, erroneous actions, and other *faux pas* known also as parapraxes and Freudian slips. His main point was that we should not "ignore the realms of determinism in our mental life" (Chapter 12). Under his close scrutiny, the errors revealed deterministic influence of factors repressing the correct actions or enhancing the wrong ones.

Freud went against the tide of the contemporaneous experimental science by neglecting the statistical analysis of as many cases as one can collect and by burrowing, instead, into individual cases as deep as one can go. His novellas on individual errors read like detective stories. In some cases they are many pages long, for example, why the names of Botticelli and Boltraffio "intruded" on him instead of the correct name Signorelli

(Chapter 1) or why the strange word Cardillac stuck in somebody's (his future translator's) memory (Chapter 12). I was not convinced: it could be explained in a different way or not explained at all. To find a single fitting explanation was certainly the worst way to look for determinism, but that was typical for Freud. If it looks like fiction and sounds like fiction, it probably is fiction.

Nevertheless, even if Freud stretched and twisted his explanatory apparatus, he opened an area where nobody had ever looked before except for fiction writers (and probably this is why he borrowed their methods): the area of the subconscious. He made it clear that the errors happened in a narrow space of associations, whether positive or negative. The actual errors were **selected** from the enormous space of all possible errors. The very volume of his observations seemed to "substatistically" prove that.

For example (Chapter 10) Freud found an error in one of his own books:

> ...Hannibal's father is called Hasdrubal. This error was particularly annoying to me, but it was most corroborative of my conception of such errors. Few readers of the book are better posted on the history of the Barkides than the author who wrote this error and overlooked it in three proofs. The name of Hannibal's father was Hamilcar Barkas; Hasdrubal was the name of Hannibal's brother as well as that of his brother-in-law and predecessor in command.

As I dare to interpret this error, Hannibal and Hasdrubal are locked in the same dark narrow cell of our memory with the address sign on the door looking like a classificator of a search engine (which is the best example of the tree topology):

Ancient History > Carthage against Rome > story of Hannibal > Hannibal's family > names starting with **Ha** and ending with **bal**.

We may mistake one for the other in the dark. The error as fact is accidental because we are mostly right, but the content of error is partly deterministic. It would not occur to us to call Hannibal's father Sir Anthony Hopkins even though there is a link in a certain dimension of the tree space.

In a slightly larger cell of

>story of Hannibal> Hannibal's family>...

in the corner of "names starting with **Ha**" we may mistake Hasdrubal for Hannibal's father Hamilcar Barca. Whether it is the **Ha** that brings the three Barkides together, or simply their kinship, or, even simpler, their geometrical closeness on the pages of history textbooks, is beyond proof in the particular case of Freud's own Freudian slip.

Similarly, Signorelli, Botticelli, and Boltraffio overlap by their **-elli** and **Bo-**.

> ***Through the relation between topology and partial order in mathematics, Graham Greene's novels, formal genetics, keyboard layout, Freudian slip, zipper, and Confucian ethics, I see the unity of Everything and its surprising wormhole (distant is in fact close) topology.***

It is the patterns of the Everything that shoot the laser beams of similarity across the Universe of knowledge.

The cosmic beauty of the picture of the Everything prevents me from spoiling it by mulling over either the catastrophic blunders of my own life or the apocalyptic dangers of errors in the digital age.

Instead, I am reading *The Comedians* again. After many years I am still under the spell of Graham Greene's compassion.

> "Perhaps the sexual life is the greatest test. If we can survive it with charity to those we love and with affection to those we have betrayed, we needn't to worry so much about the good and bad in us. But jealousy, distrust, cruelty, revenge, recrimination . . . then we fail. The wrong is that failure even if we are the victims and not the executioner."

2001

P.S. (2016). On human molecules : **Hmolpedia** (eoht.info), an A to Z *Encyclopedia of Human Thermodynamics, Human Chemistry, and Human Physics*, a unique, rich venture.

Essay 23. On the Architecture of Change

[Christopher Alexander, transition state, pattern theory, Ulf Grenander, Sisyphus, Konstantin Stanislavsky, chemistry, social change, revolution]

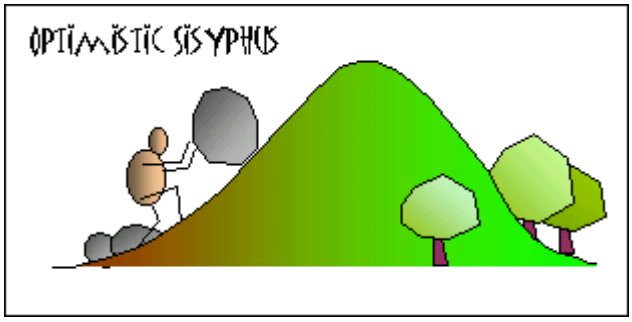
This Essay is central to my view of the world. No centrality comes easy, there is no simple way to explain how the complexity of the world can be simplified, and my task is difficult. It will be getting easier after this. In a way, I am rolling my stone to the top of the hill, like Sisyphus.

Zeus punished Sisyphus for giving a truthful testimony about Zeus' sexual misconduct. In the underworld, Sisyphus had to roll a heavy stone to the top of the hill, but the stone always rolled down to initial point, and he had to start it all over again for eternity.



Here is a fragment from an engraving. ☞ ☞

Interestingly, the animated pictures of Sisyphus do not show either the top of the hill or its other side.

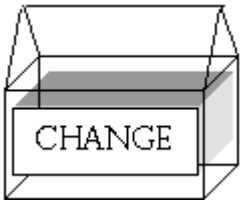


Here is my picture:

Sisyphus knows that even in the underworld there is the other, greener side of the hill and he hopes to dump his stone there and end the cycle.

It is not the first time that I am trying to put my vision of the Everything on the electronic canvass. This time, as always, I hope my stone will roll down **the other side** of the hill. The probabilistic nature of our world does not guarantee it, however.

Limited in my progress as painter by the lack of frames (**Essay 19**), I am dabbling here in architecture and design. Houses and kettles, unlike pictures, do not need frames.



I want to build the HOUSE OF CHANGE where physical, chemical, technological, biological, and social types of change could meet as a family of the general pattern.

Looking for a most general guidance, I found it in the book by Christopher Alexander: *Notes on the synthesis of form*, Cambridge, Mass: Harvard University Press, 1964.

The central concept of the author can be stated in a few points:

1. The object of design has to satisfy a set of requirements.

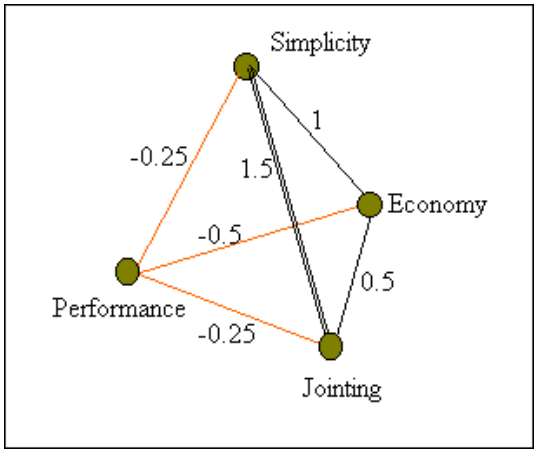
Example of a very general set of requirements:

performance
simplicity
jointing (easy assembly and compatibility of materials)
economy

2. The requirements can enhance or contradict each other. Every such contradiction is a misfit of the design and each couple of contradicting requirements adds stress to the whole.

Example: simplicity may reduce performance but increase jointing.

3. The relationships between the requirements can be portrayed as a configuration where the contradicting (antagonistic) and enhancing (synergetic) requirements are given minus and plus signs respectively. These relationships can be presented as a diagram of dots connected with lines. A table is an alternative presentation. Some quantitative measure of the interaction can be attributed to the lines.



The numbers and signs in the example on the left are intuitive and not factual. I did not take them from Christopher Alexander's book and followed my own intuition. At this level of generality the numbers do not matter. I present the original diagram from Alexander's book in the NOTES.

The antagonism is marked by red and the synergism by black lines.

The table version:

	Performance	Simplicity	Jointing	Economy
Performance	0	-0.2	-0.2	-1
Simplicity	-0.2	0	1.5	-0.5
Jointing	-0.2	1.5	0	-0.2
Economy	-1	-0.5	-0.2	0

NOTE: We could fill up a similar table for a social system with such requirements as democracy, justice, equality, etc.

4. A good design is the one with the minimal stress.

As soon as we have a set of requirements, we start tweaking the design in various directions trying to reduce the stress-causing misfits and find compromise between opposing requirements.

Finally, one design among many possible ones is chosen and launched into production.

As an example, Christopher Alexander takes a kettle that in addition to the above general requirements has to satisfy some particular utilitarian requirements:

a comfortable handle,
sufficient capacity,
access to the inside,
good heat transfer to the water
slow cooling down, etc.

Thus, the handle and the heat transfer requirements can only be reconciled if the handle and the kettle are made of different materials, which increases complexity and jointing.

It is difficult and not always possible to find the relations between requirements, quantify them, and reconcile and the book shows how to do that on a few examples.

Reading Christopher Alexander, I felt a resistance of an individualist to his method. There are at least three categories of kettles: cheap , upscale, and designer ones with different sets of requirements. The designer kettle is a piece of art and art is irrational. Its main requirement is to impress and entice the customer into buying. For that matter, any creation of a designer has the commercial success as the ultimate overriding requirement. Alexander's approach reminded me of the Stanislavsky method ("system") in scenic art. Konstantin Stanislavsky believed that the actor should rely not on inspiration and mood but on a tool kit of standardized and honed techniques to display credible human emotions and behavior. One of his goals was to spare the actor of premature exhaustion.

I don't want to be cynical, but both methods, together with the host of modern combinatorial writing and other "how to" techniques, seem to cater to the general spirit of mass production in the twentieth century. That one can create only by violating systems and methods is theory while money is reality. The democracy of Things dictates the ideology that is incomparably harder to fight than the political dictatorship. To cross the swords with the invisible hand is a pretty hard task even for a fairy-tale knight.

All that does not invalidate Alexander's concept. It contains a deep idea of stress as criterion for selection of viable versions among all possible ones. Moreover, it fits smoothly into the much more general framework of Ulf Grenander's Pattern Theory. The entries in Alexander's forms are Grenander's generators and the lines are bond couples of Pattern Theory (**Essay 18**). Instead of stress, Grenander attributes probability to bond couples and configurations.

Pattern is also Alexander's signature term and logo. The enthusiasts of his theory speak about PATTERNS movement, there is Patterns Web Page and such epithets as "a deeply spiritual work" make me feel my individualism as a cast over a broken arm.

Pattern theories of Christopher Alexander and Ulf Grenander were applied to pattern software .

We can now climb a step up and look again at the Everything as dots connected with lines. This time, however, I will be interested in the aspect of change more than in anything else.

Writers, like Graham Greene (**Essay 22**), follow the laws of nature but are not constrained by them. They select the plot out of thousands other possible versions. The misfits in the final text are minimized in the eyes of an author of Greene's caliber. The author sets his or her own requirements. The editing of the text is not constrained by physical laws of nature either.

On the contrary, the world outside human mind and virtual reality is mostly impossible. What exists has been selected from countless other configurations of the world, among which the spilled water gathers in the glass and a person hits three lottery jackpots in a row (or even one). The laws of physics, biology, and probability leave only a limited number of safe passages from the present to the future moment. What can have a large number of outcomes is mostly as irrelevant as the biographies of the strangers in the street crowd. When we say "a matter of life and death," there are only two outcomes.

Christopher Alexander's concept investigates the process of the conception of a new Thing. Whatever the set of requirements is, with or without the theory, subconsciously or with clear intent, the artist selects the final creation among others and gives it a nudge from the tender world of fantasies into the harsh world of matter and cut-throat competition. A piece of a New or a Different is born and it can be seen by jubilant or recoiling spectators.

The less stress in the design, the more probable its materialization is. Stress is high internal energy. The lower the energy, the higher the probability of turning the design into the Thing.

At the foot of the Pattern, I, a skeptical chemist, stand in the crowd of Everything, whispering my *Pattern Noster*.

Chemistry is my next pattern subject because the problems of design seem to be related to chemistry in a rather dramatic manner. One should not be surprised by odd couples in the Everything: they could be real pattern soul mates.

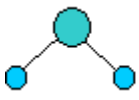
Chemistry is the science of changing molecular patterns. Molecules are configuration of atoms. Unlike abstract combinations of dots and lines, and unlike patterns of plots in novels, chemistry is constrained by the laws of physics. It deals with matter, not dreams, not keyboards, and it scrutinizes the very fleeting and intimate moment of change, almost never directly observable.

Having drawn a line between knowledge and understanding (**Essay 19, On Reading Across the Lines** and **Essay 21, On Ethics**), I do not want to go into particulars of chemistry. The core of chemistry can be understood without any attention to the properties of individual atoms and molecules. I am taking transformation of **graphs** as a simplified model, which is also a kind of mathematical metaphor.

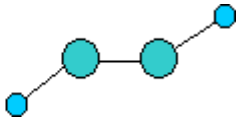
Graphs (*great page!*) in mathematics are combinations of points (dots) and lines that connect some or all of them, regardless of position and shape. Christopher Alexander's diagrams are graphs, too.

Graph is neither drawing nor table. It is **a topology**: a set of points and a set of their connections. The points are called vertices and the connections edges. In simple graphs all vertices and all edges are of the same kind, but in other, more complex graphs, one can attribute various properties to them. Thus, Alexander attributes "strength" to an edge. Ulf Grenander attributes probability. A graph can be represented by both table and diagram, as well as a list. WWW is a graph, too, with sites as vertices and links as edges.

Molecular formulas represent real molecules by graphs. They portray the topology of the molecule, but in addition they reflect some aspects of shape. They are not pictures of molecules.



Water



Hydrogen peroxide

(Compare with figures in **Essays 17, On Complexity** and **18, On Everything**)

Now, I am starting to carry my stone uphill.

Let us take a configuration **A** below as an example of a configuration consisting of two different molecules. What can happen with it? In our imagination, the configuration can change in a large number of ways. Chemical reality, however, is rather complex and specific. Instead of real chemistry, I am suggesting a game that imitates it.
Instead of chemical formulas I am using colored dots and lines. The dots symbolize atoms and they cannot disappear or pop up out of nothing. The lines, however, can be rearranged, added, or erased.

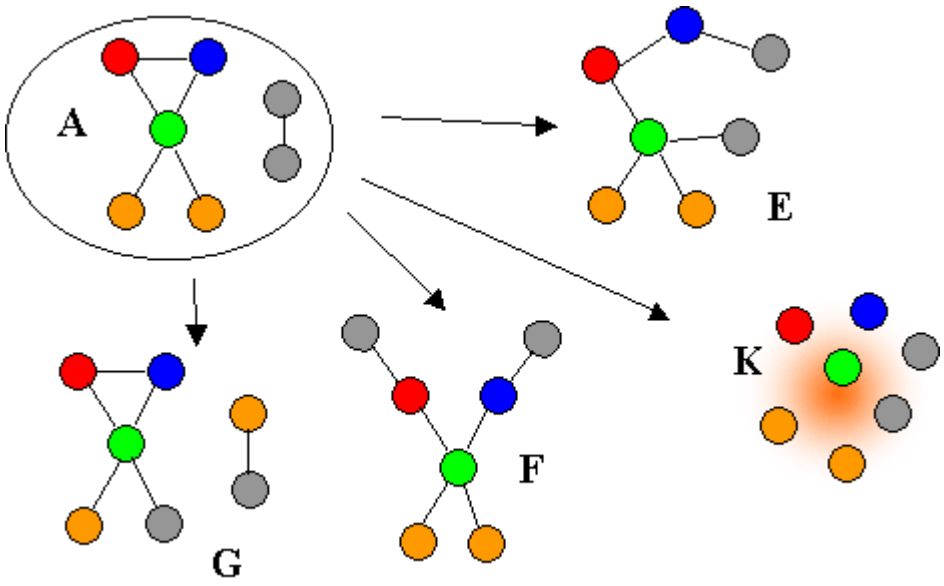
For the purpose of illustrating what chemistry is about, we need to follow only one rule of the game:

Each atom has a constant number of bonds.

Stable molecules can sit in a jar on the shelf for many years.

There are, however, unstable molecular configurations that can be compared to Alexander's misfit and stressed kettles and houses. For example, at a very high temperature all molecules are practically atomized, as in configuration K , but this is a highly unstable and even impossible configuration under normal conditions.

Configurations **E, F**, and **G** are stable because the rule is not violated.



A big question is: why would **A**, after it has been sitting on the shelf for decades, suddenly decides to turn into **G** or **F**? If that were as predetermined as the ball rolling

downhill, it would happen immediately. In fact, a spontaneous change is very rare in chemistry.

The mystery of chemistry, which chemistry can generously share with any other study of change, is that the change needs a push, like the ball that should be rolled up before it can go downhill.

At the top of the chemical hill, the changing molecules take an irregular, "hot," "stressed," "misfit," rich of energy, and short-living configuration: transition state. Energy is needed to bring them there. Sisyphus used his muscles. A chemist sometimes starts at the top by simply mixing the reacting components. Because of the distribution of molecules by energy (see **Essay 14**), there are always elite molecules hot enough to engage in reaction. If not, the chemist activates them by heating or radiation.

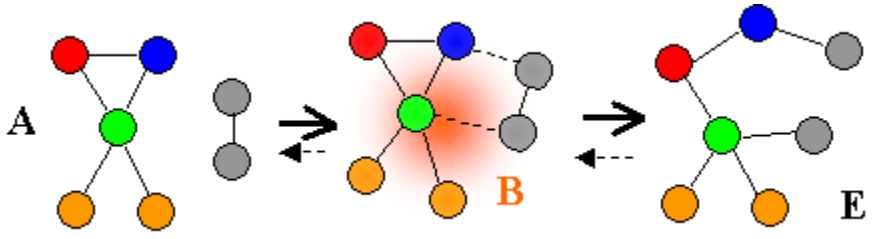
> **NOTE**: Compare this with the sociological theories of Vilfredo Pareto about the role of elites in society (end note in **Essay 16**).

Usually, there is a wide selection of possible transition states, more or less stressed. The lower the stress (in Alexander's terminology), the higher the probability that the structure will reach the top of the hill.

The height of the hill is the energy of the transition state. The imaginary thermal micro-Sisyphuses will carry the molecules to the top if they have enough thermal energy.

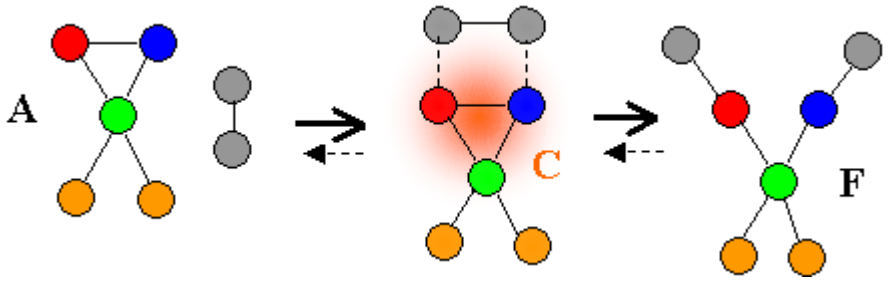
Whether the transition state rolls back or down the other side, will depend in chemistry on the ground level on both sides. Chemical systems are in principle reversible. The final result of a chemical reaction is determined also by of equilibrium. In complex biological and social systems nothing is reversible. The irreversibility is the fundamental property of life. Evolutions of life, society, and technology do not know equilibrium.

Here is one transformation through a hot transition state (in chemistry it can run in both directions). The "illegal" stressful transient and temporary bonds are shown by broken lines. They are "misfits" that increase the energy of the hot transition state **B** that can cool down to either **E** or back to **A**. To tell the truth, all bond couples in their neighborhood are not themselves anymore and they should be drawn by broken lines. I show the irregularity of the transition state by the red spot.

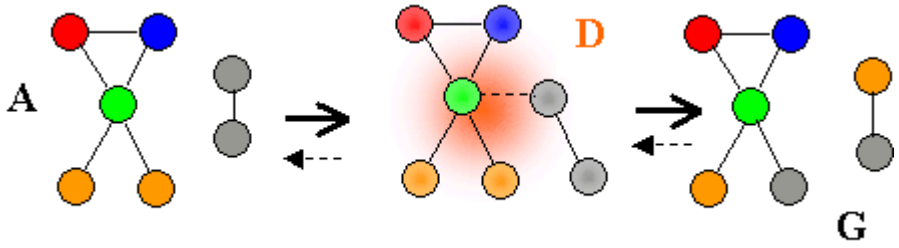


Transition state: **B**

Here are two more (and more are possible):



Transition state: **C**



Transition state: **D**

The general principle of change through a transition state (it comes from physics) applies to Everything.

Design is a transition state that can roll over the hill and generate a Thing or roll back to the initial stage.

> The less stressed the design, the more probable its **selection** for production.
> The less misfits in a performance on the skating ring the closer the figure skater to the top rank.
> The fewer misfits in a beauty contestant's dress and body the closer she is to the crown.
> The less controversial a legislative proposal the higher its probability to pass the Senate.
> The lower the energy of the transition state the more probably the chemical reaction will go through it .

Any change of a complex system can be examined from this angle.

There is another aspect of the whole process. In order to change, the system has to be heated up or given a jolt of energy in some other form.

The designer, artist, scientist, politician, and general in the process of creation and making a decision is in an excited state, under the pressure of uncertainty, urgency, and responsibility. The figure skater and the beauty contestant are heated up by the nervous and uncertain atmosphere of the competition. Same applies to political debates over a **hot** issue.

In order to start a chemical reaction, if it does not start spontaneously at mixing, the chemist heats up the components or increases their energy by irradiation.

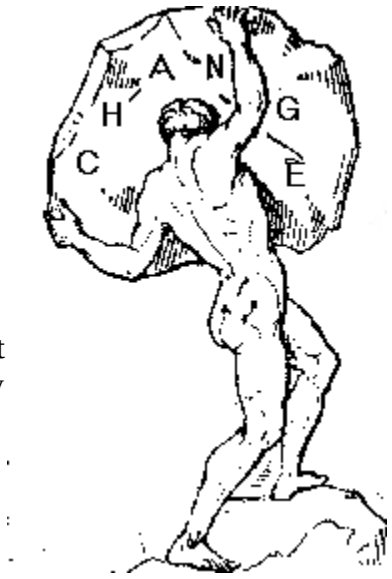
Revolutionary social change starts when the political atmosphere heats up as result of crisis, war, hunger, or discontent.

Political and social reforms usually follow a transition state of turmoil, dissatisfaction, and anger.

Contest, crisis, war, and all such extraordinary situations are relatively short-living against the course of individual life and history. They are transition states loaded with chaos. Life and history is a series of ground level periods of regularity punctuated by flares of irregularity, the "points of no return" of Graham Greene (**Essay 22, On Errors**). In history of society, culture, and technology, the lucky Sisyphus has a name and is remembered for a very long time. Sometimes it is a horse.

Revolutions and reforms can never be completely reversed but they can vacillate back and forth as it was after the French Revolution and is apparently happening in the post-Communist Russia.

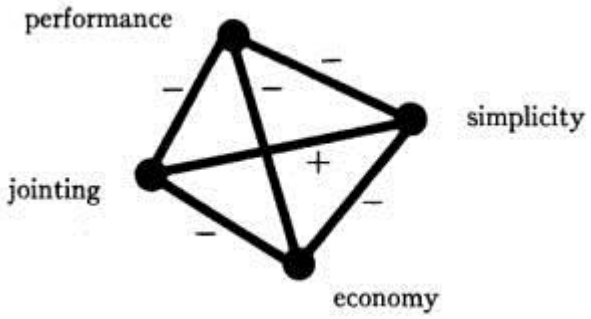
In general, my optimistic version of the myth of Sisyphus is a metaphor of change in a wide variety of systems. The energy (stress, misfit, chaos, temperature) of the system increases, the invisible Sisyphus rolls it up the energy hill, and at the top there is always a chance that the system will roll down to the other side of the hill instead of going back to the starting point. And, by the way, a hill has many other sides.



To expand this concept would mean to go from understanding to knowledge, which is beyond my intent (see END NOTE 4 for a great source). I feel completely exhausted by rolling the stone of understanding in this Essay. I hope the stone fell onto the greener side of the hill. Let it sit there as a corner stone of the HOUSE OF CHANGE. I need a break. There is more about Sisyphus to come.

END NOTES:

1. Here is the original diagram from Alexander's book on synthesis of forms:



2. The word pattern came to English from the Latin *pater* through the French *patron* that had gained a secondary meaning "a model" in the fourteenth century.

> Along Eric Partridge, *Origins: A Short Etymological Dictionary of Modern English*, New York : Greenwich House, 1966.

3. Some ideas of this Essay are further developed in our *History as Points and Lines*, together with Ulf Grenander. On Pattern Theory: Ulf Grenander, *Elements of Pattern Theory*, Baltimore and London: Johns Hopkins University Press, 1996.

4. The final result of a chemical reaction is determined also by factors other than transition state. The position of equilibrium, in particular, is important. Life and history, however, do not know equilibrium. There is a really *wonderful and deep site* of Frank L. Lambert about some principles of thermodynamics and chemistry of general significance for the Everything. Main topics: Time's Arrow, Murphy's Law, Activation Energy, Chemical Kinetics, Chemical Bonds.

2001

Essay 24. On Myself

[ideology, systems, large and small systems, simple and complex systems, individuality, topology, Randall Collins]

There are various ways to see the world: rational and religious, philosophical and scientific, historical and static, in terms of matter and energy, subject and object, animate and inanimate, order and chaos, fact and image, code and expression, good and evil, etc.

The Everything is not a pronoun but the whole viewed through a prism that splits the whole into blocks and bonds between them. It is not just a list of all things but the list of their neighborhoods, i.e., all the other things directly connected to the given one.

Myself is definitely a pronoun and it stands in a mysterious and troubling relation to Everything.

"Everything is water," we could echo Thales of Miletus. A Graham Greene's character makes a casual note at a funeral in *The Human Factor*:

It was a pity one couldn't throw a man back into the river of life as one could throw a fish.
Graham Greene, *The Human Factor*

Life is like river: it runs only downward. Loss, error, illness, and often even love are catastrophic waterfalls.

A man in love walks through the world like an anarchist carrying a time bomb.
Graham Greene, *The Human Factor*

The river overflows the dams of gain, victory, and triumph, losing energy along the way. The energy of the sun can return the water back from the ocean to the river head, but there is little solace for an individual in the turnover of matter. For millennia, only the soul has been a matter of concern.

With so much affection on my part for the unity of the Everything, as with any affection, it is easy to lose the sober view of the object: the Everything has a composite nature. It is made of our internal individual world and the external one like the surface of the Earth is made of land and water. The two components are dramatically different: the solid land has borders and the fluid ocean does not.
As with all borderlines, even the distinction between land and water is blurred in the

swamp and in the tidal zone of the sand beach.
Of course, we, humans, are islands, but we are made of salt, share the same rain, and have our own brooks running into the ocean. Myself, however, is not a part of We.

The presence of humans in the picture of Everything calls for a coarse classification of its components. If the humans could conspicuously stand apart, it would certainly break the unity. Humans need to have some neighbors in the systematics of Everything.

As an exercise in such rough classification , I see the following basic division of Everything along two dimensions: complexity and size. On complexity, see **Essay 17, *On Complexity***. Instead of *size* I could say "multiplicity." I prefer, however, a down-to-earth term to a technical one. Anyway, they both need explanation.
I understand *size* as the property of having multiple copies of similar units or blocks (generators). A physicist would call this property *degeneration* (see NOTE 1), the bad connotation of which makes yet another argument on behalf of *size*. A more direct argument: one is one, but many can be counted in the units of one. *Size* is a number of unities. The sequences 11111 and 111 have different size. Neither Myself nor Everything has size in the sense I use this tern here. They are singular.

Listing the following four types of systems, I illustrate them by sequences of numbers in square brackets, to give an intuitive idea. This classification is not rigorous and logical: it is intuitive.

1. **Simple small** (SS) systems.[1 2 3 4]

The clockwork mechanism has a limited number of parts and they can be in a limited number of states. The clockwork's behavior is highly predictable. Most man-made Things belong to this category, at least ideally. I would put the solar system in this category, too, but it does not matter because we cannot do anything about it.

Simple and small systems deserve respect. They are the real tidal zones of the Everything from which the creatures of higher status have been crawling out since the genesis of life on earth. Among SS systems we see the extremely important switching device as well as the Turing machine (see also **Essay 15, On menage a trois in the Stone Age**).

Watching the behavior of my personal computer, I can see that it is a clockwork with an attitude of its own, which, I suspect, is inspired by Microsoft ideology.

2. **Large simple** (LS) systems. [2 2 2 2 3 2 2 2 2]

Even a droplet of water consists of a very large number of indistinguishable molecules. A single molecule of water represents all the water in the universe. To be accurate, the molecules of water have somewhat different properties such as speed, rotation, and even shape, but they constantly and very quickly change them. Water is a statistical ensemble.

LS systems contain multiple identical (or closely similar) copies of a limited number of species.

3. **Small complex** (SC) systems. [1 2 3 4 5 N; N is a large number]

Small complex systems have a large variety of components but a few duplicates.

We have only one brain, one left eye, one right eye, and one digestive system. Such systems have their statistics, too, but in time instead of space. Individual animal and human are such systems. They are **complex,** because of a large number of components, states, and interactions, but **small** because they are not in multiple copies (except at the cellular level).

The fate of the system that is not an ensemble of a large number of similar units but a structure where a large number of components exist in a single copy can be catastrophic: it has no spare parts. A symmetrical organism with pairs of organs and extremities is a weak compromise. The systems of this kind are almost as vulnerable to catastrophes as the watch under the mallet, but they still have significant flexibility because their cellular subsystems are large.

We can put some large Things and institutions, like airliner, ship, and business company, into the same category. They all have unique functional points or organs and they have a limited margin of viability with duplicated systems, like the US government with president and vice-president.
Living organisms, including humans, from this point of view, fall into this category.

4. **Large complex** (LC) systems. [1 1 1 1.... 2 3 4 4 4 ... 5 6 6 6]

Social ensembles of humans are **large** and **complex**, but not because all humans are as different as the parts of the clock. The similarity between humans largely exceeds the differences between the types. Such systems may seem simple, and in a sense they are, but only in a very limited sense. Ensembles of consumers are certainly almost as simple as ants.
Society and ecosystem have a large number of units consisting of large number of individuals.
The complexity of modern society comes not as much from the radical differences between human components (as it is in the case of organism) as from the hierarchical structure of the society. People take positions in a unique structure where any position can be filled up with a number of different people.

Society has statistics over both time and space.

It is very difficult to destroy a nation, culture, and ethnicity. They rather evolve and merge than go down in an instant because an empty position in the structure can be replenished from the mere number of identical or closely similar components. In this

aspect, societies and biological species are like water. No revolution or war can completely destroy a politically developed nation, at least it has never happened in thousand years (I might be wrong), although mass extinctions might have happened in early history and attempts are fresh in memory. Colonial history, too, might provide some sad examples.

NOTE: History and the Bible left the names of many peoples that do not exist anymore, but their genes and memes are spread among existing nations and cultures. At the same time, there are a lot of modern ethnicities that carry very ancient names, not only Egyptians, Iranians, and Jews, but also less known ones, like Assyrians. There is an interesting discussion on Assyrians, Egyptians, Jews, and other modern descendants of legendary ancient peoples: 1, 2.

In the surrounding world, therefore, we see four kinds of dynamic systems that conventionally can be called, somewhat like car models:

SS: small and simple (clockwork)
LS: large and simple (matter)
SC: small and complex (organisms, large Things, institutions)
LC: large and complex (society, ecosystem, economy).

The above types not only have fuzzy borders but can form composites. Thus, an organism is mostly water. Society comprises humans, Things, and even some animals. The Everything includes them all.

The purpose of my classification is nothing but to show the composite (heterogeneous) character of the Everything as I see it, with the important difference between the unique and the multiple. The main subject of this Essay, however, is an even coarser classification.

Does Everything include Myself?

Once we are inside our own skin and look at both the world outside and the world inside, talk to ourselves and write diaries, we are absolutely unique and singular. We are as unique as the Everything.

Almost everything in the world exists in many copies: stars, atoms, plants, animals, Things, books, people. Even a unique piece of visual art can be coded, stored, and reproduced with most of its content preserved, and a documentary is a fair enough substitute for a trip to a faraway place. Even extinct species can be reconstructed in a movie. Modern art in general (**Essay 20, *On Artificial Art***) can be approximately reconstructed simply by walking through its combinatorial space and finding a similar and close object. This may be true about any art, as soon as we know the dimensions of the creative space. Any cubist picture of Pablo Picasso or Francis Bacon can be redeformed into a new, recognizable, but yet unseen picture. We simply crawl through the combinatorial space of art, as a worm through an apple, visiting Raphael, Rembrandt,

and Rothko and imitating them, as the art forgers do. Moreover, we can mate, blend, and cross them. Transformations of this kind are often done in theater and architecture.

One could say that the same is true about any individual representative of a species. The combinatorial dimensions of a species of fish (scales, fins, eyes, shape, etc.) can produce all possible individual fish of this species, and the same can be true about humans. Apparently, evolution was playing with pieces of genetic Lego when it constructed new species. The fish, however, do not leave diaries, and we do not know how one diary would differ from another.
To tell the truth, all human diaries are, in a way, alike, but not for their authors.

The individual is unique, alone, and if it breaks down like Humpty-Dumpty, it cannot be put together again. The species, on the contrary, are resilient, adaptable, and they would rather evolve into other species than completely perish. The dinosaurs go on living as lizards. Monarchy goes on living as monopoly. Aristocracy lives on as rich and famous. Even feudalism lives on as modern company (**Essay 5. On Medieval America**).

Myself does not fit any of the four classes of Everything because it is small and large at the same time.
It is small because nothing in it exists in multiple copies.
It is large because it reflects large systems, lives among them, and manipulates them.

It is not human species but **Myself**, **I**, **Me** that stands apart and breaks the symmetry of Everything, its systematics, and neat logic. **I** belongs to Everything and stands outside of it at the same time. It is a stressful subject if you think about it too much. The brook of philosohy has been running through millennina from this crack in our mind.

It is the mystery of the individual consciousness that divides Everything into its land and water, with a twilight zone where the dream and the fact are both just gray shadows. It is from the interface between them, I believe, that art comes into the outer light.

From the double nature of the Everything-Myself relation come not only art and philosophy, but also religion, science, politics, and the mundane experience that could be managed well without philosophy and religion.

More important, from it comes ideology, which is neither of the above. Ideology spans from the primate of the anthill over the ant to the ideology of ultimate regal individualism: *Après moi le déluge*. Ideology is always centered on an individual. Mass ideology simply means that the majority has the same personal ideology.

I believe that the subject of the relation between myself and others is the core of ideology. It is not completely covered by ethics and philosophy.

Examples of ideologies:

I am unique and others are not similar to myself. I am all that matters. **Us** is temporary and opportunistic.

I am unique but others are similar to myself and I can identify myself with them up to a point.

I am unique but a few others are **Us**, an extension of myself. The rest are a different kind, **Them**.

I am unique and others are extensions of myself. Who hurts them hurts me.

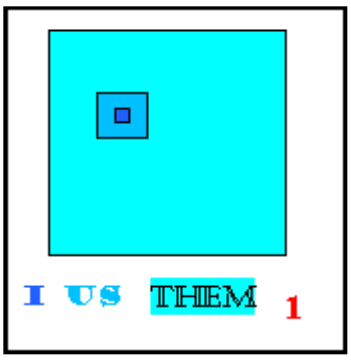
The herd, flock, and pack ideology is not quite what altruism means because the latter is always personal: it is a sacrifice for another person or a couple of the closest ones. Altruism is a form of egotism: alter-egotism. Collectivism of the Soviet type required a sacrifice for the faceless society, and, apparently, so does Islamic brotherhood.

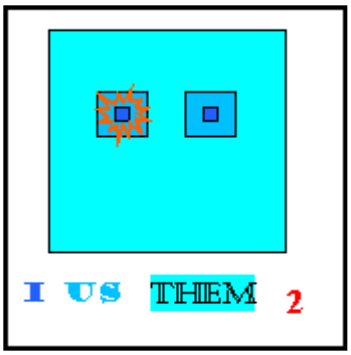
Something like the Cuban *Patria o muerte* was valued in the antiquity more than altruism. I cannot deny that the collectivist idea has an instinctive appeal. Many people risk their lives for strangers, lands, and ideals. To die for an idea sounds great and martyrs are worshipped.
I suspect, however, that it is the iron cage of **Us** that in tribal "anti-something" ideologies limits the freedom of an individual who, in a loose net of individualism, would value his or her life more than principles. A circle of friends, the most benign form of **Us**, can seriously limit the freedom of an individual not just by peer pressure but by the height of the transition barrier on the way out. A teenager may prefer to die rather than break the bonds, and a terrorist may prefer to die rather than betray trust or break an oath.
The ways of life of teenagers and terrorists seem evolutionary archaic as compared with the modern American denial of loyalty (see NOTE 2).

The others—how much are they like myself? This is what ideology is about. The views of a dictator, racist, Marxist, nationalist, humanist, terrorist, criminal, and even a big boss mark up different ideologies. Ideology sorts out the people into Me, Us, and Them.

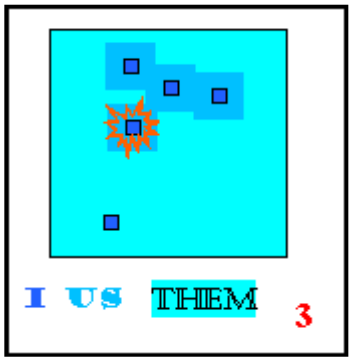
The essence of a political ideology is entirely topologic: there is a selected point, its neighborhood, and the rest of the space. Ideology is topology (see **Essay 22, On Errors**) on a set with a selected point.

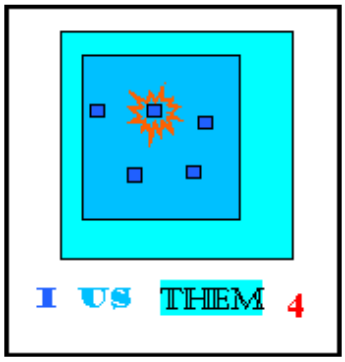
Here are some examples of ideologies constructed from three elements: **I**, **Us**, and **Them**. There could be more combinations.





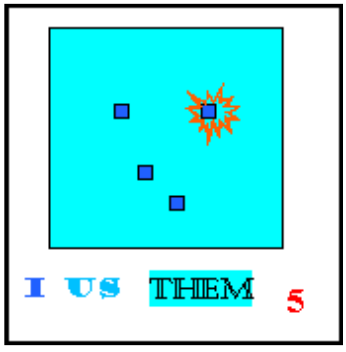
1. I am a part of **Us**, the rest are **Them**. There is a border between **Us** and **Them**.
2. **I** am part of **Us**, but there are others like me. Myself = 

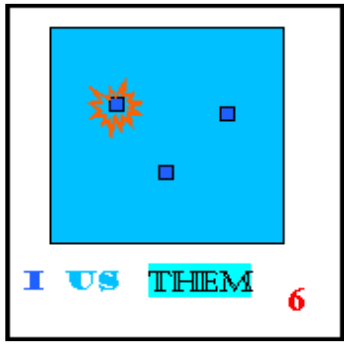




3. There are others like me but **Us** has open borders and can overlap.
4. There are others like me in **Us** but **We** have closed borders, and the rest are **Them**.

There can be variations within this and other types depending on the structure of relationship between individuals: equality, domination, democracy, or republic.





5. We are all loners among **Them** . I have no loyalty to any **Us**, and others are like myself. *Homo homini lupus est*.

6. All people are a brotherhood of equals, a big **Us**: an idealistic view. It would be realistic if not for the competition over a limited resource, and the resource of political power is always limited.

The ideologies are perceptions of the world from the point of view of **Myself**. The real world, i.e., the world outside **Myself**, has no **I**. The internal world, where **I** resides, has only a reflection of a small part of the outer world.

The dividing solid line in the figures means a transition barrier. In all the above figures **I** has solid borders, but in militant tribal ideologies this barrier can be quite low.

In my figures the light blue field of **Them** has a solid border. It separates legally recognized **people** from the fourth category, **the white field**, the **non-people** where neither of the first three abide.

The violent ideologies, like Fascism, Communism (against private owners), and Islamic terrorism, as well as some specifically targeting violent "anti-" ideologies of race and cast supremacy (virulent anti-abortionists, too) exclude their targets not only from **Us** but also from **Them** and put them into the white field in the above figures. Those in the white field are pests and can or must be destroyed, always in the name of some noble cause.

My perception of myself has been changing with time.

At this stage of my life I believe that details of my deeply personal beliefs, habits, and memories do not matter.

In my childhood, my world was very small and mostly predictable. With the adulthood, the search for my place in the rapidly expanding by experience and education world became painful and all-consuming. It was the time when Montaigne's *Essays* assured me that I had the right—not just an inclination—of independent thinking. I had discovered individualism. Montaigne was my first inoculation against communism in its post-Stalin form.

With age, especially, after 60, I got a feeling of shrinking self-importance, not just time. Looking through Montaigne, while writing this Essay, I had an impression that Montaigne saw himself only as a sample of a human for study, a pretext for a discussion, and its starting point, as we use the weather to start conversation. I think that Montaigne was a good sample because he represented common sense not bound by ideology—the same common sense that took over Europe and North America after Industrial Revolution.

I consider myself a very odd and inappropriate sample for extrapolation. My views are usually different from the common sense views. My actions often surprise myself and I cannot always control them. I never wanted to be like everybody and to dwell in the hump of the bell curve. What I needed for success was Ideology 3 and I did not have it.

What makes me myself? I believe it is my search for the invariances of this world as a whole. Looking back I clearly see how it always distracted me from normal successful life despite my honest attempts to follow the general course. I liked the invisible world of ideas more than anything else our civilization had to offer and I still regard it as the highest luxury. Today anything else has as much attraction for me as a soap opera.

In my childhood I was greatly fascinated by the stories of the polar explorers Roald Amundsen, Fridtjof Nansen, Robert Peary, Ernest Shackleton, and Robert Scott. It was my favorite reading at the age of ten. I believe the idea of discovering something that had been there unseen by others had a strong appeal to me for the rest of my life, but I certainly lacked the ability to make it seen by others. Besides, when a cup of coffee is all you need to reach the mental South Pole, it is difficult to be the first. Anyway, I still enjoy my Sisyphean exercise very much.

I realize that in an individualistic society, paradoxically, an individual is perceived by his or her brand name, like a Chinese warrior by his war banners. The transition barrier into the space of attention is high from somebody outside the network.

> **NOTE**. The space of attention and network of intellectuals are two of the basic components used by Randall Collins to construct his *The Sociology of Philosophies: A Global Theory of Intellectual Change*, Cambridge, Massachusetts, and London: The Belknap Press, 1998. Two other components are cultural capital, which seems similar to matter, and emotional energy, which is just what it says: energy. There is another possible interpretation: cultural capital as energy and emotional energy as temperature.
>
> This unique and revealing book deserves the brightest spot in the space of attention for many reasons, including its innovative, colorful, and witty style. Its most interesting theoretical part is highly readable and absorbing. Philosophers, according to Randall Collins, look like a pack of monkeys grooming or snarling at each other. Just joking.

I do not know what matters most at the very end of life. I suspect it is the small love circle of **Us**. We shall see.

What is **my** ideology? Probably, #2: **I** am part of a small **Us**, but there are others like me and I have no access to them and to their neighborhoods.

I wish I had a different ideology, but there is nothing I can do. It is a tortured mindset, I am punished for it, but the punishment is sweet. Well, bitter-sweet. And coffee is still cheap.

NOTES

1. DEGENERATION in **WEBSTERS'S NEW UNIVERSAL UNABRIDGED DICTIONARY:**

> Physics. a. (of modes of vibration of a system) having the same frequency.
> b. (of quantum states of a system) having equal energy. --n.

2. On loyalty any many other things.: Robert B.Reich, *The Future of Success*. It is a wise, soft, prophetic book. No online review is good enough.

3. This Essay is the first one finished after September 11, 2001.

In the end of Chapter 15 of my *Memoirs of 1984* I wrote:

> I know that if any ideology takes the place left in the world by communism, it will be orthodoxy and fundamentalism. In the algebra of history the C-word stands not for Marxism-Leninism but for the rule of orthodoxy and fundamentalism of whatever content.

I think it is Ideology #6.

2001

Essay 25. On Zippers

[system. change. transition state. activation energy. zipper. dislocations]

Animation links refer to Web files. Click on blue arrows or the word ANIMATE.

The question I am interested here is how a system changes. I am coming back, therefore, to the subject of **Essay 23, On the Architecture of Change**.

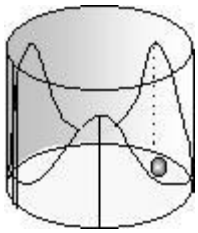
In **Essay 24, On Myself,** I was looking for a place for myself in the Everything. I took notes of addresses of some possible dwellings, taking complexity as the avenue and size as the street, and making no demands about the architecture.

I am going to use the image of Sisyphus rolling his stone over the hill, from **Essay 23** , but without Sisyphus. The stone alone will do. I only want to remind that in chemistry change happens because the energy of molecules spreads over a certain interval, so that the most vigorous of them have enough energy to jump to the top of the hill. Others take their place. The molecular "stone" behaves more like a tennis ball.

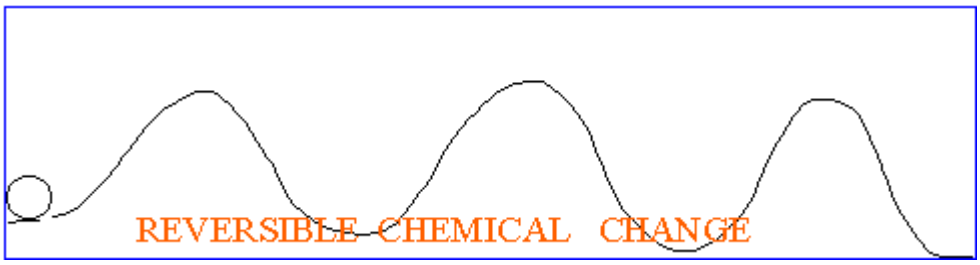
Change in society, as I see it, happens for the same reason with mostly angry, agitated, and excited (or simply clever) people instead of molecules or due to an individual Sisyphus who manages to push the heavy stone over the hill.

I will use here some animations. They can be viewed by clicking on the link **ANIMATE** or on a blue arrow**.** The **BACK** button of the browser will bring the page back.

My first animated illustration, **Figure 25.51**, shows change in a **small simple** system. It has a small number of stable states that looks like valleys between the hills, with the height of the hill corresponding to the energy of the transition barrier. The stone goes from valley to valley in any order. All the valleys are about equally deep and all the hills are equally high. We should imagine the picture below as rolled into a cylinder, so that the landscape is continuous and the walk over the landscape is random.



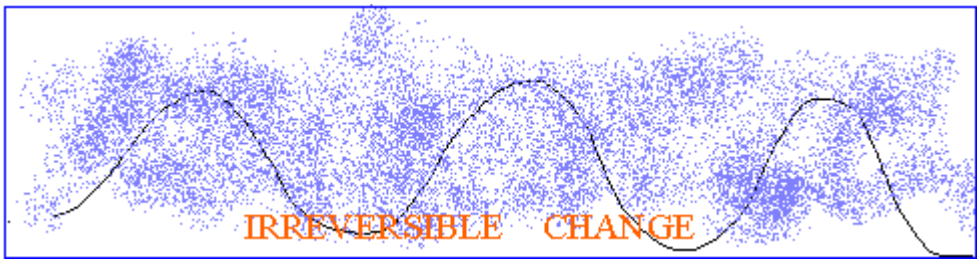
I could make the illustration more realistic but I don't think this would be worth rolling my own stone for that uphill.



ANIMATE **Figure 25.1**

Figure 25.1 would be a general case, but in highly **ordered** systems, like the clockwork, the stone would simply go around in the same sequence.

The second diagram, **Figure 25. 2,** shows change in a **large complex** system. I start it with an initial state that can be regarded either as a Medium Bang or as a dark place of *Genesis*, 1:1, "without form" but not quite void. I do not mean here the universe.



ANIMATE **Figure 25. 2 Let it be light!**

Figure 25.2 should not be turned into a cylinder because it evolves by rolling the stone over a changing landscape. There is always a hill ahead, there could be a retreat back, but the stone steadily moves ahead, and the hill ahead is always new, although it can be similar to some hill in the past.

A small complex system, for example, a corporation, evolves in time, but it can also jump between several patterns of functioning, for example, recession, new competitor, merger, spike in demand, major lawsuit, etc. A large complex system, like nation, goes through situations of revolt, crisis, war, legislation shift, etc.

History of France is a remarkable example of almost two century long vacillation between authoritarian and republican systems after the French Revolution, and history of Russia presents a similar example of shifting back and forth from liberalism to iron

rule. On a much smaller scale, America shifts between Republican and Democrat governments, with the dynamism of evolution overshadowing the differences.

The general pattern of the terrain can go up or down, and it is an intriguing question on what it depends.

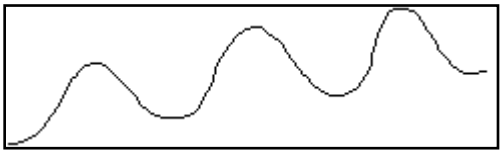


Figure 25.3

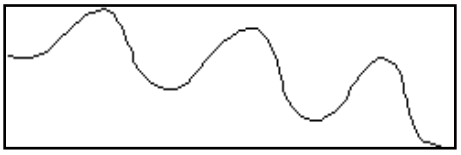
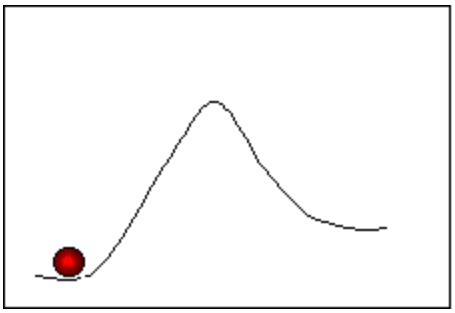


Figure 25.4

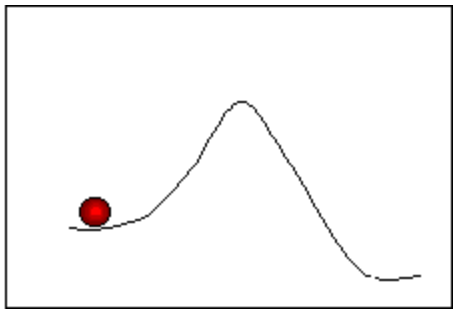
I believe it depends on the production of energy (more accurately, **free energy**, see **Essay 7, On the Smell of Money**) , but I feel not fit to go into particulars of non-equilibrium thermodynamics that are different from those of the classic one.



If the energy of a system goes up, the system becomes less stable and more capable of jumping over the transition barrier. There are two possible situations in a transition: the other side of the hill can be either deeper than the initial one or it could be the opposite. A simple system with just one hill will spend more time in the deeper valley.

← The deeper valley is on the left.

ANIMATE **Figure 25. 5**



← The deeper valley is on the right.

The problem is that in a large complex system we never know what is on the other side of the hill. The future is unpredictable. Human mind, however, can list most of the future alternatives as falling into past patterns. It is the pattern that connects the future with the past. Naturally, the future can present a **new**, never seen pattern.

ANIMATE **Figure 25. 6**

Those are two types of the roller coasters of change. Our clocks are lucky to ride the circular type, but we, humans, have all the fun of riding the roller coaster that we can comprehend in its entirety only when we are almost at the end.

One of the possible historical ways to make a rising landscape less steep is to decrease the buildup of energy by humans. It can be done in at least two ways: by decreasing population and/or by decreasing physical movement that requires most physical energy. For example, as an ultimate sci-fi picture, a planet can be populated by something like motionless silicon devices feebly exchanging light signals with each other through a fiber network and producing a new device only when one of them is damaged.

> **NOTE**: More accurately, it is appropriate to speak not about the buildup of energy but about the distance from equilibrium. To maintain a position far from equilibrium, which is always inherently unstable, the system must consume free energy and dissipate it into heat. When the sources of mineral energy are exhausted, the general intensity of human life can go down, closer to equilibrium.

As if to foreshadow the possible future, we call each other and send emails instead of meeting in person. Computers consume very little energy. If terrorism or fuel scarcity becomes part of life, people might travel less and less and lose interest in each other.

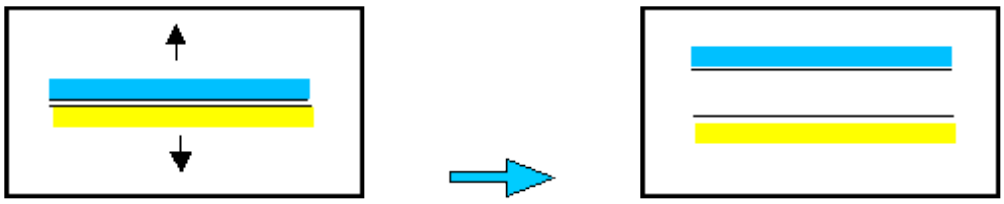
There is absolutely no reason to be fatalistic and pessimistic because we can imagine only what belongs to known patterns and can never imagine the radically new ones. On the new and the different, see **Essay 20, On Artificial Art** .

My final question is how a large and complex system can change in a radical way.

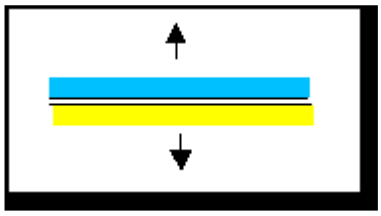
Any imaginable small change has a certain probability. A radical change of a big system consists of a large number of small changes. Therefore, the probability of such large change (more exactly, conditional probability) directly depends on the products of many fractional numbers, which is a very small number.

The reality is that the small changes do not happen all at once. The change of a large system happens locally and is spread as a sequence of stages over time. I already mentioned the theory of dislocations in **Essay 22, On Errors** and the similarity of a large deformation to zipper.

My next animated illustration shows the character of change in a small system. It is difficult to separate two parts of a large system with many internal bonds.



It is easy to split the system through an ordered sequence of small changes:



ANIMATE ZIPPER

This is the way zipper works. Each of many small consecutive stages has a high probability and, more importantly, they are lined up instead of branching out, as it is typical for events in complex systems, for example, chemical reactions, military battles, and historical transformations.

The zipper effect has extremely important implications in molecular biology, but this is the knowledge outside our working map here.

Small systems are vulnerable because their zippers have a small number of teeth and can be easily torn apart.

A big problem arises: what is stronger in a direct clash: fluid democracy or iron autocracy?

I think that the outcome of a military confrontation depends on the strength of the armies, and all the armies are supposed to be iron autocracies. In a non-military confrontation, I would not bet on liberalism against a violent autocracy. But the autocracy is incomparably more vulnerable than democracy where liberalism is balanced by common sense. Democracy heals its wounds, while autocracy has brittle senile bones.

The twentieth century brought to life a new kind of organization: global network. We do not have enough experience with them. The Communist network broke down after the fall of the Soviet Empire. This may suggest that cutting off the sources of energy and a blow on the head would do the same to a terrorist network.

NOTE: On the story of zipper, see Henry Petroski, *The Evolution of Useful Things*: *How Everyday Artifacts—from Forks and Pins to Paper Clips and Zippers—Came to Be* . New York: Vintage Books, 1994.

2001

P.S. (2016) "A big problem arises: what is stronger in a direct clash: fluid democracy or iron autocracy?"

History of the twentieth century clearly showed that the democracy-to-autocracy transformation can run much easier that the reverse autocracy-to-democracy restauration. The current century is producing no rebuttal. By autocracy I mean not only the regimes of Hitler, Stalin, and Putin, not to mention scores of smaller figures, like Jacob Zuma, but even an election of an autocratic leader, whether he or she is then successful autocrat or not. It is not easy to kill established democracy, but it is much easier to throw a monkey wrench into its gears. From this point of view, the American experiment in Elections 2016 is conclusive already before the end of primaries and the national vote: an autocratic, dishonest, and self-possessed demagogue can go far when the angry (i.e., overheated), unsophisticated, and uncritical electorate hears what it wants to hear. This pattern is deeply rooted in human nature. But the same history shows that, in a direct clash, autocracy is brittle and a few hits can break it, probably, giving way to a new autocracy. See **Essay 58, All Rational Minds are Alike; each Irrational Mind is Rational in its Own Way** about human irrationality. The supporters of Donald Trump are rational in their own way: they do not have a **simple reason** to distrust their idol until the future turns into the present. Besides, those who put Trump in the company of Hitler and Stalin, have no reason, either. It is a pattern of belief as surrogate knowledge that runs through millennia of history and is as much a property of a naïve human mind as desire for freedom and independence, wealth and power, love and respect, truth and security. For more about belief, see **Essay 60, Art and Nexistence**.

The US Experiment 2016 has a new feature, however. None of the three major tyrants of the last hundred years came to power in an established democracy, all the more, as mature and lasting as US democracy. Therefore, there is a good chance that the minor strongman will fail.

Essay 26. Terrorism: The Other Side of the Hill

[terrorism, transition state, September 11, Walter Laqueur]

Fresh memory of any dramatic event is distorted by emotions. They change the perception like the round aquarium stretches the shape of the fish in the water. At least, the fish is alive.

Something like that happens in everybody's personal life. With time, old grievances and infatuations fade away and seem aberrations, and the wound of the loss heals. We live on with the scars.

With time we can contemplate the unperturbed skeleton of a catastrophic change on a historical scale, but we cannot live on as before because the very ground under our feet is different. While the analytical skeletal perception goes into history textbooks, the live view is lost forever. This is why historians value memoirs of eyewitnesses: they capture the ephemeral transition state of the change that itself is often driven by emotions.

My major emotion in the afternoon of September 11, 2001, when all had been over, was the pain of a great defeat, accompanied with the pain of anger and the pain of shame. The scale of death and destruction was so enormous that it suppressed the terror itself.

Large numbers imply extra-human dimensions, but the disaster was man-made. The most powerful country in the world, the greatest democracy, and the only remaining superpower, the big, beautiful, liberal, and comfortable America, my sweet home for fourteen years, was defeated in an assault.

The pain of defeat, anger, and shame are exactly some of the components that most probably were the nutrients of the potting soil for terrorism. My first impetus was revenge, in which, two weeks later, I still see a natural and justified desire of victory. The French *revanche* is more appropriate. The English *revenge* is closer to the "an eye for an eye" vengeance. It was as if I had been challenged to become a terrorist myself. I instinctively approved of the commando style counter-terrorism: "one eye for three thousand eyes."

Two weeks later after September 11, I was already certain that the assault could have been prevented if the American apparatus for prevention were not flawed. The failure was imminent.

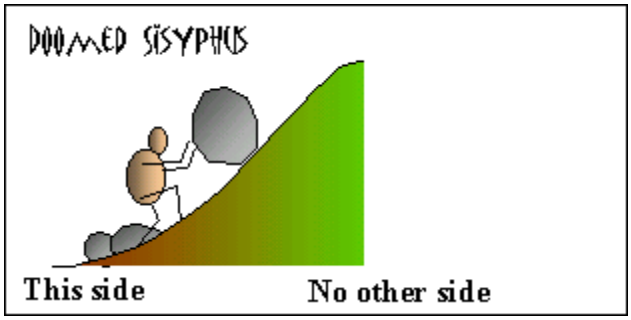
My way of thinking in terms of defeat, loss, fault, and guilt was purely emotional, i.e., fully appropriate in the temporal vicinity of the event. I could see how deeply I, with all my skepticism, distrust of flag waving, suspicion of patriotism, and with a centrifugal force pushing me off any crowd, became emotionally grown into the American national soil that had given me for the first time in my adult life the feeling of home. I was defeated together with everybody. A part of my home fell crumbling. Revenge!

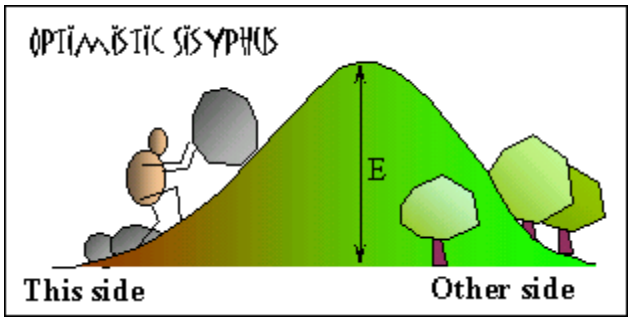
Immediately the process of sifting history out of the chunks of steel and human flesh, as well as attacks on Muslims and pacifist incantations, started in the media that used to notice the existence of the rest of the world only for an ultimate extravagance or ultimate disaster. Many dozens of specialists, diplomats, scholars, clerics, former statesmen, and consultants from an even larger pool of informed professionals were busy assembling the jigsaw puzzle of the large failure that culminated in September 11.

Meanwhile I was in the middle of my Essay project.

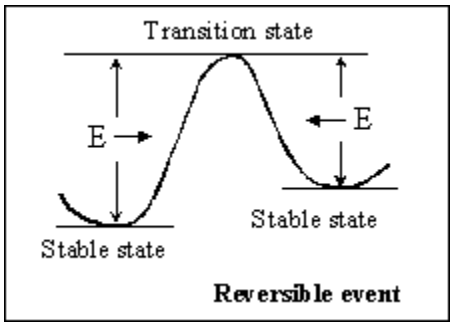
In **Essay 23. On the Architecture of Change** and **Essay 25. On Zippers** I tried to answer the central for me question: why and how the change happens.

I invoked the image of Sisyphus that rolls his stone uphill, to the top of the transition barrier. In the myth, the stone rolls back because there is nothing behind the top and nothing can change. In real life, if there is a new valley behind the hill, the stone can roll down to a new reality.





NOTE: A chemical reaction can be irreversible for some particular reasons. A metaphor: a pet dog can return home after wandering; a released wild animal most probably will never return.



The stock market normally also possesses the property of micro-equilibrium. What is lost today can be gained tomorrow. The same is true about gambling. Over a long time, however, the market is believed to move only up and the roulette gambling can only deplete the player. This is always just a belief. Medium stretches of time, where loss or gain can be protracted and irreversible, can, in principle, exceed one's life.

In fact, the roulette is a small simple system and is fully predictable. There is no paradox in my statement because I mean the statistical prediction. Economy is a large complex system and even a long term prediction concerning the stock market can be wrong. The entire picture can be reversed in the conditions of a violent global competition for limited resources (land, energy, and water) in which the West has a large numerical disadvantage. History is full of examples of irreversible decline, without which there could not be history.

Large complex systems, such as society and evolving biosphere, roll over the barrier to the new, unseen, and unthinkable valley behind which a new hill chain stretches up to the horizon.

But here is a problem. How can it be? How can anything happen for the very first time if it had never happened before? We cannot list the future states because we cannot see any past.

The answer could be that if there is a space, the new state is just a point in this space, which was never visited before but existed as possibility because of the properties of the space. Thus, we may never be able to put our finger on the ceiling of the room, but it is possible because there is nothing between us and the ceiling. A fly can never visit the inside of a closed chest drawer, but theoretical it is possible because the drawer opens from time to time.

In biological evolution, a new species is determined by a new combination of the same basic four nucleotides in its genome. In this sense a new species is never exactly new: it is just different.

NOTE: This perception may change when we know more about how new genotypes are formed. *A priori*, there must be a source of novelty even in molecular evolution. One possibility is a bundling of segments of DNA into a hierarchical system so that not all sequences are equally probable.

A biologist, who looks at the appearance, behavior, and ecology of the species and does not care much about DNA, pays attention to the shifts from the **different** to the **new**: digestion, movement, skeleton, lungs, nervous system, etc., come as the new, which is reflected in the taxonomy.

Biological evolution, therefore, occurs in an expanding taxonomic space, by inclusion of new dimensions. The same is true about evolution of any large complex system. The civilization space has been expanding.

Evolution and history consist of a sequence events that could be reversible on a short time scale, like the money supply and discount interest rate set by the Federal Reserve, but irreversible on a larger scale. This applies to individual life, too. The long days of childhood may all look alike but the parents see a fast progress. The child turning into adult experiences the quickening pace of an irreversible transformation. Same is true about the adult life punctuated by the moments of dramatic irreversibility.

What happened on September 11 was a large scale historic moment of irreversibility.

When humans set goals, it is human imagination that describes the valley on the other side. If I want to go shopping and plan to buy apples, the transition barrier between my present state and the future state of returning home with the apples is low: it amounts to the physical energy and money I need to get to the shop and to buy what I want. It may be high if I need to drive while out of gas.

The prisoner is said to always have an advantage over the jailer because he thinks day and night about the way out and the jailer has many other things to think about. The prisoner knows that the transition barrier between his current state and the imaginary free state is very high and he examines the wall for the weak spots.

The terrorists thought a lot about the other side of the hill, they saw a clear sequence of steps uphill, and they saw that the hill was not steep. The prisoner and the jailer have the same view of the stable present state. Moreover, they have **the same view** of the possible future state, with different consequences for them. They both believe that the wall is high. The function of the jailer is to keep the wall high. The goal of the prisoner is to make it lower. After the prisoner develops his plan, they have **different views** of the transition state. Both visions are tentative, probabilistic, and carry no guarantee.

My point is that in the modern society with a large pool of experts of all kinds and the overall abundance of intelligent and imaginative people there are always people who can see the transition states (scenarios) of large scale events as good as the evil planners. There is always a game going on between the good and bad guys at a professional level.

My next point is that all the components of the September 11 were known in advance:

1. The precedent of an airplane crash into a skyscraper (14 people killed and 25 injured), when a B-25 medium bomber crashed into its 78th and 79th floors of the Empire State Building on its north facade. It was on July 28, 1945.

> "The building shuddered, realigned itself, and settled. Probably instantly, although several witnesses said there seemed to be a moment's interval, came the explosion, and the top of the fog-shrouded Empire State Building was briefly seen in a bright orange glow. High-octane airplane fuel spewed out of the ruptured tanks and sprayed the building…The heat was so intense that partition frames within offices disappeared, and the shattered glass from windows and lamp fixtures melted and fused into stalactites….One engine, part of the fuselage, and a landing gear tore through the internal office walls, through two fire walls and across a stairway, through another office wall and out of the south wall of the building, with the parts coming to a fiery rest at 10 West Thirty-Third Street in the penthouse studio/apartment of sculptor Henry Hering, who was off playing golf in Scarsdale at the time,"
>
> John Tauranac, *The Making of a Landmark,* New York: St. Martin's Griffin, 1997, (originally printed in hardcover by Scribner, 1995).

2. The terrorist idea to crash a hijacked plane into Eiffel Tower, when an Air France airplane was hijacked in Algeria.

3. The ability of people, including the middle class, to commit a collective suicide (the Heaven's Gate cult in 1997, the mass suicide in Uganda in 2000, and many other examples) because of their own vision of this or the other side.

4. The existence of a terrorist organization with strong will, abundant money, and a long series of escalating successes, including the World Trade Center bombing on 26th February 1993.

5. The well-known weakness of security at the American airports.

6. The realization of the impending danger, as Walter Laqueur saw it in his "Postmodern Terrorism: New Rules For An Old Game," (FOREIGN AFFAIRS - September/ October **1996**).

> The Bible says that when the Old Testament hero Samson brought down the temple, burying himself along with the Philistines in the ruins, "the dead which he slew at his death were more than he slew in his life." The Samsons of a society have been relatively few in all ages. But with the new technologies and the changed nature of the world in which they operate, a handful of angry Samsons and disciples of apocalypse would suffice to cause havoc. Chances are that of 100 attempts at terrorist super-violence, 99 would fail. But the single successful one could claim many more victims, do more material damage, and unleash far greater panic than anything the world has yet experienced. To this I would add:

> Now the house was full of men and women; all the lords of the Philistines were there, and on the roof there were about three thousand men and women, who looked on while Samson made sport. (*Judges*, 15:27)

7. The saturation of our land and air with "powder kegs."

In movies a shot into the powder keg often decides the outcome of the battle with pirates and other bad guys: they are blown into pieces by their own ammunition.

Our civilization is filled with powder kegs charged with enormous energy: airplanes, moving cars, missiles, nuclear bombs and reactors, oil and gas storage facilities, tankers, and even tall buildings. Any skyscraper has enormous potential energy approximately measured by the half the product of its mass and height. It needs only a strong enough push to fall down and release the energy. For this reason alone it is not reasonable to build high.

One such powder keg was zeppelin, a blimp with a metal frame, filled with flammable hydrogen. The famous *Hindenburg* of Nazi Germany, adorned with swastikas, exploded in Lakehurst, New Jersey, in 1937, after ten successful trans-Atlantic flights. Was it an anti-Nazi sabotage?

Although it spreads death, terrorism is a form of life. It evolves and adapts. When the entrance barriers are raised, instead of bringing weapons and ammunition into the target country, terrorism uses internal energy of the target and releases it to cause destruction. It shoots into its enemy's powder keg.

Events like September 11, WW1, WW2, and the collapse of the Soviet Union in 1991 happened simply **because they could happen.**

> They can happen because they can be imagined.
> They happen with a significant probability if the transition barrier is low.
> They happen rarely if the barrier is high.
> They happen easier when the open liberal democracy lowers all barriers in principle.

Sometimes they cannot happen at all: the invention of a flying apparatus was improbable in Ancient Greece with all its intellectual potency even though the idea of a flying contraption had existed in the myth of Icarus. The mental image of a flying man had to wait for two millennia before the technology was propelled by the image.

Weapons of mass destruction were technically imagined long before they became reality:

> Science fiction writers produced chemical weapons even earlier. In Jules Verne's *The Begum's Fortune*, a (German) scientist aims to wipe out the

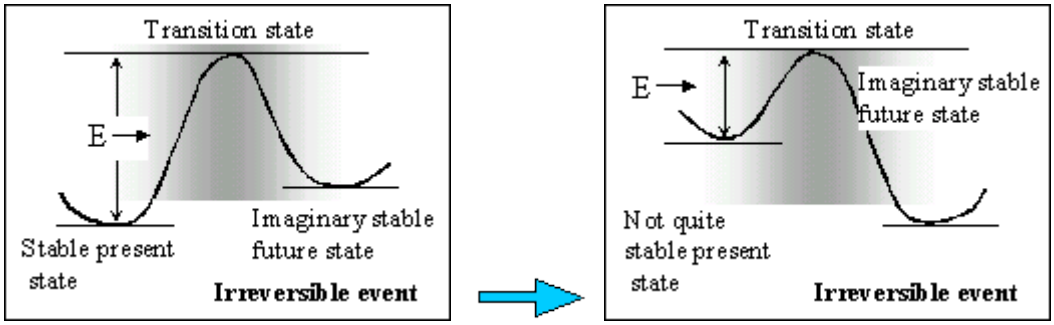
250,000 inhabitants of (French) Franceville with one grenade of what he calls carbon acid gas, shot from a supergun. (Walter Laqueur).

NOTE: *The Begum's Fortune (Les Cinq cents millions de la Bégum)* was published in 1879. Walter Laqueur was not quite correct. In the book, the city of Frankville was built in the USA.

My next point is that there is an obvious wall of a different kind: the wall between the experts and the politicians. As a recent example, I can mention the wall between our current climate and global warming. It was not overcome because of the difference in the visions of the politicians and the scientists. The transition state is so high that the cost of the program could be enormous. The evidence of the man-made gloom on the other side was not quite convincing and the bright vision of the goal was not quite enticing.

I have no intent to go into politics and take sides on this subject. Nevertheless, there is a sad parallel between the global warming and the September 11 aftermath. Before the actual disaster nobody would spend that much money and effort on patching up the wall that could have separated us from the attack. There was a wall not so much between the experts and the politicians—I believe the politicians were concerned enough—as in the mentality of the potential voters who influence the decision of the politicians in a democracy. The politicians clearly saw that there was no chance to reach even half the hill.

What happened after September 11 was the sudden increase in the social temperature: the social warming. Our current agitated state now has a high energy and is unstable. In terms of physics, it is an excited state. In common language, it is unsafe, precarious, hazardous, risky, and shaky. The transition state does not seem as high as before and we (not all, though) are anxious to pay the high price for erecting a wall on the way of future terrorists:



Social warming

The same applies to the transition barrier toward suicide, as well as mass murder.

NOTE: The situation of internal conflict is known in social psychology as cognitive dissonance, see **Essay 8, On the Buridan's Ass**. See also **Essay 24, On Myself** on the topology of human relations.

The macabre other side of this hill can be made attractive by religious belief, and the Koran, with all its militant spirit, is not unique. Compare quotations:

> "For whosoever will save his life shall lose it: but whosoever will lose his life for my sake, the same shall save it." (Luke 9:24).
>
> "And reckon not those who are killed in Allah's way as dead; nay, they are alive (and) are provided sustenance from their Lord." (Koran, 3:169).
>
> As for: "O you who believe! do not take the Jews and the Christians for friends; they are friends of each other; and whoever amongst you takes them for a friend, then surely he is one of them; surely Allah does not guide the unjust people." (Koran, 5:51), the Crusaders, definitely, felt the same way toward the Muslims, although there was not a trace of Muslims in the Bible, for obvious reasons.

Religious texts do not prove anything. They could be interpreted in many ways and used to justify any gruesome deed.

I believe, basing on vast historical evidence, that the barrier toward mass murder of unarmed people is usually lowered by excluding the enemy from the category of true humans (**Essay 24**), and that was how the terrorists saw Americans. Faith can be murderous, whether sacred or secular, and religious extremism has always been a social powder keg. In the end, ideas kill on the larger scale than bullets.

I wish to repeat for the third time in these Essays that no idea is good or bad on its own. Any idea is evil if there is an **unopposed violent** force behind it.

Montaigne has a wonderful essay on anger.

> No passion disturbs the soundness of our judgment as anger does.
> Montaigne, *Essays*, II, 31.

Montaigne writes that his own anger was as short as it was lively.

Anger makes people lose control. I made my worst decisions in life under the influence of anger. Looking back, I can see that my problem was that all my strong emotions, if they did not go away overnight, as most did, were long-lasting, viscous, stagnant, all-consuming, and I had no chance of coming back to my normal state fast enough.

> Aristotle says that choler sometimes serves virtue and valor as a weapon. That is most likely; nevertheless those who deny it have an amusing reply: it must be some new-fangled weapon; for we wield the other weapons: that one wields us; it is not our hand that guides it: it guides our hand; it gets a hold on us: not we on it. Montaigne, *Essays*, II, 31.

I can imagine how people's anger in the Middle East is being daily whipped up by the psychotic atmosphere of mutual hate and murder, so that even normal and reasonable people have no time for relaxation and coming back to their senses. But there could be

additional reasons for educated people to plan mass murder in cold blood for years, especially, on European soil.

As a cynical believer in simple reasons, I look into the basement and not the loft of human motivation.

I believe that anger and despair increase the internal energy and, therefore, decrease the relative barrier toward making a pledge to give up one's life as an ultimate sacrifice. But once the pledge is given and life goes on, it is the shame under the tribal pressure that prevents reversing the decision. The managers of terrorism make such natural human fluctuations irreversible.

To keep one's word is a universal virtue. Loyalty is considered one of the moral pillars outside the modern Western culture, probably, as a compensation for the heavy pressure of wide spread actual betrayal.

When we bemoan (rarely) the loss of loyalty, we forget that betrayal has lost most of its practical impact in the individualistic society where everything seems expendable and disposable. Betrayal does not cost us our lives anymore. It is different in the authoritarian and tribal countries of the East where loyalty is precious because it is rare and is a matter of life and death for both sides.

The roster of political murder in the East is staggering. All the murdered Gandhis, related or not, are just one example, all the more striking because it was done in the culture of **ahimsa**, nonviolence.

Another basic instinct driving the techno-terrorists is, probably, just the fun of the game that glues the hacker to the computer keyboard, thief to his trade, scientist to his bench, writer to the sheet of paper, and politician to the microphone. Terrorism is creative.

Whether courageous or stupid, the suicidal terrorist is a miserable figure deserving compassion like any victim because there is always a mature spider safely hidden in a corner of his web who pulls the strings and pushes his own people over the edge of life. The laws of history demand we pay with human lives for any new quiet valley. I see a sad and ironic confirmation that the history has not yet changed despite the growing role of Things in it. We still must carry our stone on our bare back to the top of the hill, not knowing what expects us ahead. Probably, there are even more Things there. We are not yet ready to swap Things for greener pastures.

NOTES:

1. The complete English *Bible* contains about 750,000 words. The word *kill* is used 215 times. The Koran (complete text) contains about 168,000 words. The table presents approximate occurrence of words **kill** and **love** in the texts.

Text	Word count (approximate)	**kill**	one word per	**love**	one word per
Books of Moses	157,000	46	3400	47	3300
Gospels	90,000	64	1400	75	1200
Koran	168,000	44	3800	83	2000

2. June, 2002: More and more facts confirm that September 11 not only could be prevented but should have been.

2001

Essay 27. The Existential Sisyphus

[transition state, existentialism, energy, Ilya Prigogine, Ulf Grenander, physics and ethics, Sartre, Camus, Randall Collins, Pitirim Sorokin, Sisyphus]

The image of Sisyphus has captured my imagination since my early school years.

In Russia, the history of Ancient World was taught in the fifth grade and mythology was part of it. Besides, "Sisyphus' labor" was a common expression in the Russian language and throughout my life I was periodically sentenced to what it meant. It was not as much futility as compulsion that depressed me in such work. My very first month of college experience was Sisyphus' labor in the corn fields of Ukraine, to which all the freshmen were condemned for the lack of hands on the collective farms. We were simply loaded into freight trains and open cargo trucks and unloaded in the midst of the steppe.
I used the image of Sisyphus in **Essays 23**, **25**, and **26**, not for its philosophical connotation, but to illustrate the concept of transition state in individual and social life.

Sisyphus has to spend energy to accomplish his chore. Energy is a fundamental concept of Everything and not just physics. There is no definition of energy in some more primary terms. Energy in human life is what our brain and muscles have to spend in order to either accomplish something or to fail. They can spend it only if they first consume it.

The distinction between success and failure is alien to physics. Instead, physics offers a key distinction between two kinds of energy: creative work and destructive heat. More important, it describes the ways to convert the latter into the former, which has been the true essence of the Industrial Revolution, our current civilization, and some of the current global conflicts.

Through the narrow isthmus of information theory, physical ideas penetrate the continent of humanities and spread north to south like the ancient Asian wanderers through the American continent.

Hundreds of millions of people on earth are still living off sheer muscle power. A few lucky nations live off the sale of energy taken from beneath the surface of the earth. Other nations keep themselves happy by converting the mineral energy and matter into countless Things and moving around. The Things in the form of weapons invade the

jungles and deserts and disrupt the pre-industrial way of life without offering anything else.

The image of Sisyphus connects the physical and human aspects of energy. It links physics to ethics. This is a long shot: a Seattle to Miami highway on the map of Everything. I am coming back to it again, hopefully, for the last time.

Transition state applies to a system in process of transition from one relatively stable state to another stable state.

Examples:

Initial state	**Change**	**Final state**
A piece of paper and the oxygen in the air	Burning	Ashes and gaseous products of combustion
A pack of cards	Building a house of cards	A house of cards, collapsed.
USA before the Civil War	War and Reconstruction	USA after Reconstruction
USSR in 1987	Collapse of Communism	Former USSR in 1991, no longer existing.
USA on 8:00 AM, September 11, 2001	War on terrorism	Unknown future

Of course, no final state can be literally final. "Final" is a metaphor.

Transition states can be subdivided into shorter intermediate periods of lower and higher instability.

On September 11, 2001, America entered a historical transition state. There was an approximately two week long period of high agitation and some confusion, which ended in an intermediate quieter state of awareness and preparedness. The next transition state was expected to be a military campaign and it started on October 7. The ideal final state would be the world with very low probability of large scale terrorism over state borders.

The true transition state, by definition, cannot last long. It has to undergo relaxation somehow and decrease its energy. In social systems, transition state consumes so much energy that human nature, social structure, and productive forces simply cannot sustain this way of life. All wars end with victory, defeat, or peace treaty and all revolutions end up in some kind of order, even if pregnant with another crisis.

The energy that is released in a burning piece of paper is a subject of physics.

The somewhat mysterious human energy that is released or transformed in acts of creation, destruction, and reform, is ultimately a form of the same universal energy because it all comes from food, but this does not tell us how to measure the spiritual energy of humans like we measure the electricity and gas consumption by corresponding meters.

I have no ready research on the subject of creative human energy, but some crude ways to measure it have been since long universally accepted . Thus, the number of scientific publications and the number of references to them in other publications are components of a measure of width and depth of scientific productivity. The number of publications alone does not characterize creativity.

Randall Collins, in his already mentioned (in **Essay 24, On Myself** ,) outstanding book *The Sociology of Philosophies: A Global Theory of Intellectual Change* (Cambridge, Massachusetts, and London: The Belknap Press of Harvard University, 1998), measures the eminence of a philosopher by the number of references to him in books on history of philosophy. He also introduces the emotional energy as one of the two major properties of a philosopher in **competition** with other philosophers for "attention space." The other property is cultural capital that can be, probably, metaphorized as matter.

This kind of quantitative method (somebody called it "an orgy of tabulation") in sociology can be traced back to Pitirim Sorokin (1889-1968), the American sociologist of Russian descent who in his multivolume *Social and Cultural Dynamics* (1937-1941) measured the intensity of historical process—its energy, as I would say—by the mere number of acts of revolt, turmoil, and revolution. Sorokin's outstanding idea was to give a certain weight factor to the amplitude of the turmoil, so that a lot of small events would weigh as much as a few big ones.

In textbooks of sociology I found notes of surprise (for example, in George Ritzer, *Sociological Theory*, NY: A.Knopf, 1983) that Sorokin had been ignored by contemporary sociologists. Now it looks natural in the light of the competition for attention space and span. While natural sciences are collective enterprises where theoretical conflict is short-living and can be resolved by experiment and observation, social sciences are still in the transition to a collective and cooperative mode of operation by methodological consensus.

Even with such a hyper-ego-charged field as philosophy, where a newcomer first shatters all the existing temples and then proceeds to build his own edifice from the repainted bricks, the prospect of a unified approach seems more than fantasy. Randall Collins believes that a kind of meta-mathematics can be its ultimate distant shape.

Now, back to Sisyphus from whom a chain of links leads to philosophy and existentialism in particular.

Albert Camus' essay on Sisyphus, poetically vague, full of paradoxes, and with ample space for multiple interpretations, is considered an existentialist text. It is about suffering, time, and triumph.

Existentialist philosophy is a diverse and incongruent international collection of works themselves swathed into thick layers of interpretation.

Any philosophy (and usually a piece of scientific work) starts with declaring a problem. Existentialism does so by rejecting the ancient idea, first introduced by Aristotle, that all humans are essentially equal. It discriminates between common man and an intellectual. The problem is the inherent, not just transient, anxiety, discomfort, anguish, and suffering of modern intellectual. The anguish, like modern laxative, comes in several flavors.

I would refer for existentialism itself to a web site (there are many others) and to a small and old book that states some existentialist tenets with incomparable clarity hardly found in the primary sources themselves: Robert G. Olson, *An Introduction to Existentialism*, New York: Dover Publications, 1962.

This book does something the sources do not: it places existentialism as a configuration in the history of philosophy and shows what bricks of the wrecked old temples were used as they were, and which were repainted white to black, or, following Randall Collins' idea, taken with the minus sign, i.e., as negation.

I do not feel any affinity to existentialism and I am not much familiar with the original works, except Nietzsche and Dostoyevsky. I have only a superficial, mostly from anthologies, knowledge of Kierkegaard and Sartre. All four possessed an intense imagination, creating a stream of metaphors and brilliant fragments. They all, especially, Kierkegaard, are illustrations of what temperature of a mental process is.

> Sometimes, there is such a tumult in my head that it feels as though the roof had been lifted off my cranium, and then it seems as though the hobgoblins had lifted up a mountain and were holding a ball and festivities there—God preserve me! (Soren Kierkegaard, *Journals*, February 9, 1838)

> Prone, outstretched, trembling, Like him, half dead and cold, whose feet one warm'th-- And shaken, ah! by unfamiliar fevers, Shivering with sharpened, icy-cold frost-arrows, By thee pursued, my fancy! Ineffable! Recondite! Sore-frightening! Thou huntsman 'hind the cloud-banks! Now lightning-struck by thee, Thou mocking eye that me in darkness watcheth: —Thus do I lie, Bend myself, twist myself, convulsed With all eternal torture, And smitten By thee, cruellest huntsman, Thou unfamiliar—GOD... (Friedrich Nietzsche, *Thus Spake Zarathustra*, LXV).

Sartre seems to me more calculating. Eloquent in polemics, he pattered on substance in his hyphenated, in the manner of German philosophy, jargon.

> Love is a fundamental relation of the for-itself to the world and to itself (selfness) through a particular woman; the woman represents only a conducting body which is placed in the circuit. (Jean-Paul Sartre, *Being and Nothingness*).

The long range concepts, however, were open to different interpretations.

My private view is that Soren Kierkegaard (1813-1855), who is regarded the unsuspecting founder of the movement, was part of the general movement of European psyche from the comfort of belonging to a privileged group such as social class (with ample leisure time) , position (teaching), education (university) , and creed (mainstream Christianity), in other words, from stable-state group mentality, toward individualism, in which Renaissance and Montaigne in particular were true starters. His inflamed imagination was jumping over the landscape of individualism in all directions back and forth, never staying in a valley of a system, and it was the landscape itself that he left to be rediscovered later. Like Nietzsche and Dostoyevsky, he was a walking transition state, but unlike them, his transition was reversible: all valleys were equally green. What Sartre did was an attempt to create a system. If the truth is subjective, no system is possible. With perfect logic, postmodernism swept away the very idea of truth.

When the society loses the rigid hierarchy and group structure that used to stretch the safety net under the upper windows and balconies, the intellectual suddenly feels naked, vulnerable, and burning in the hell of competition. No collective idea can offer comfort. A profitable sale can.

Dostoyevsky (1821-1881) and Nietzsche (1844-1900), two most intense, obsessed with religion, and psychotic writers of the well-mannered nineteenth century were in the vanguard of the next wave, unknowingly. No translation can render the pathology of Dostoyevsky in original, and Nietzsche in *Zarathustra* speaks for himself. Both were mentally unwell, diabolically creative, and feverishly intense. Both posthumously attracted scores of worshippers.

Preoccupied with the transient and problematic individual life, they came to opposite conclusions: Nietzsche appealed to the superman in man, while Dostoyevsky's ideals were selfless love, humility, self-restriction, and compassion. With hindsight, we can consider them prophets of the nightmares of next century. A lover, family man, and intellectual is given a gun and sent to kill and be killed.

Fascism appropriated Nietzsche, but very few can see that the Dostoyevsky's ideal of humility and self-sacrifice was partly incorporated into Stalinism and subsequent Communist ethics. As it was typical for that period, access to his books under Stalin was restricted, he was declared reactionary, and was not studied at school. Both writers were posthumously recruited into the existentialist camp together with Kierkegaard who published his books at his own expense, mostly, under pseudonyms and was translated from Danish only in 1941.

> **NOTE** : Karl Jaspers (1883-1969) connected the names of Kierkegaard and Nietzsche and used the term "existential philosophy." Martin Heidegger (1889-1976), not a writer but a pure and complex philosopher, denied his link to the movement, but was hooked up anyway. I have an impression that philosophy of the twentieth century was in the same relation to their predecessors as abstract art to classical one.

I believe that existentialism, as we know it, was single-handedly created and promoted by Jean-Paul Sartre (1905-1980). Philosophy went on sale.

> **NOTE:** Randall Collins' *The Sociology of Philosophies* is full of sparkling and irreverent observations and outbursts. Existentialism takes slapping on both cheeks from him . He brands existentialism as "...the highbrow end of the writer's market." "literary-academic hybrid" (p.764-756). He notes that "Sartre was the first philosopher in history to be heavily publicized by popular mass-media." To analyze postmodernism for him was beyond dignity.

Still, the knot of controversies in Sartre is intriguing.

Sartre and his generation lived under the shadows of Marx, Hitler and Stalin. The third wave, and, especially, Sartre, was driven by the humiliating personal experience of the world wars, as well as by infatuation and subsequent disappointment in Marxism. Personal lives of practically all existentialist writers were deeply troubled for different reasons and they had a brush with one historical rhinoceros or another.

What they all discovered, I believe, was a deep inequality of people before the fate, otherwise called God. The fate was unjust. The fate was deaf to all religious and philosophical principles, intelligence, sophistication, education, and self-perception of the victim. The fate spat on Plato, Aristotle, and Hegel. The fate was lawless.
The "discovery" had been previously made by countless number of common and privileged people throughout history. The memoirs of the glorious Pope Innocent III (1160?-1216) begin with the words: "What is man if not ashes and dirt?" The fate in the person of God was given the credit of the doubt and accepted.

Atheistic existentialism created a new faith centered around individual who was lost among other countless individuals. The existential creed was neither monotheism nor polytheism. It was multitheism or autotheism: each individual was his own god, with all due reverence to God, and had to make his own fate—something known since long, natural, and subject of pride in America. A God's blessing was simply a start whistle for the fight. Paradoxically, the suffering individual had to listen... not to himself, as the logic would require, but to Sartre and Co. who incredibly complexified simple dilemmas of everyday life and repackaged the old and simple personal philosophy of the common man.

Why then was Sartre so involved with Marxism? I believe that the political doctrine offered to individualists a new group platform with the promise: the happy ones, the bourgeois, will be punished. This is how Marxism recruited intelligentsia in Russia and abroad.

Kierkegaard sounds like Marx when he lashes out at happy bourgeois:

> Morality is to them the highest, far more important than intelligence; but they have never felt **enthusiasm for greatness**, for talent even though in its abnormal form. Their ethics are a short summary of police ordinances; for them the most important thing is to be a useful member of the state, and to air their opinions in the club of an evening; they have never felt **homethickness for something unknown and faraway**, nor the depth which consists in being nothing at all...(Soren Kierkegaard, *The Journals*, July 14, 1837)

> It (capitalism) has drowned the most **heavenly ecstasies** of religious fervor, of **chivalrous enthusiasm**, of philistine sentimentalism, in the icy water of egotistic calculation
> Marx, Engels, *The Communist Manifesto,* Part 1.

Somebody who cannot be happy, cannot stand the sight of happiness around. A cynical believer in simple reason, I see a straight line between the terrible poverty in which Marx and his family lived in London and his idea of expropriating the bourgeoisie ("In one word, you reproach us with intending to do away with your property. Precisely so; that is just what we intend." *Manifesto,* Part 2).

So much for existentialism. I am ashamed of my own cynicism.

As Tanweer Akram noted, existentialism was confusing but intoxicating.

Regardless the answers, the questions existentialism raised were legitimate. It was about the detailed philosophical mechanism of human life, not about grand abstractions.

To my own surprise, I found some parallels between existentialism and the concept of transition state.

My link to Albert Camus' *Sisyphus* is the metaphor of a hill, energy, and work. Camus was interested in the moment when Sisyphus was descending the hill, for a short while free of his burden. In the natural, not mythical, transition process, it is the least interesting part because it is spontaneous and does not require effort. It is like the behavior of the basketball when it has already gone through the hoop: it does not matter.

The existential view of life is a chain of decisions that man has to make. The doomed Sisyphus of the myth cannot make any decision: all decisions have been made for him. Whatever he thinks and feels does not matter: the ball has gone through the hoop. Camus' essay is a piece of art that has as much to do with life as Picasso's nudes with his models.

And yet there is a deep truth in the existentialist metaphor: choice as transition from deterministic **being** to unpredictable and pregnant with novelty **becoming**.

The question is how the future is made. Can we influence it? Should we just rely on God in heaven or God of Spinoza under our feet? How should we accept suffering? How can we avoid it? Those are some of the questions philosophy tried to answer by searching

with the mental flashlight over immutable and internal ideas, God, spirit, laws of nature, and even the transient and fleeting surface of things.

Unlike philosophy, physics has a limited yet universal vocabulary of thermodynamics for the entire diversity of the world. For physics, life and society are open systems far from equilibrium. It is the relation between consumption and dissipation of energy (production of order) that characterizes their dynamics.

If in my metaphorical illustrations I use energy instead of production of order, it is with the sole purpose of simplifying of the picture. The accurate, although not complete, physical picture can be found in popular form in the numerous books by Ilya Prigogine, a Nobel Laureate in physics whose autobiography clearly shows him as a Renaissance man deeply immersed in arts and humanities.

The title of one of his books, *From Being to Becoming: Time and Complexity in the Physical Sciences*, (San Francisco: W. H. Freeman & Co.,1980), restates the central problem of existentialist philosophy, although he, as far as I know, did not join any philosophical ranks. He wrote in an interview :

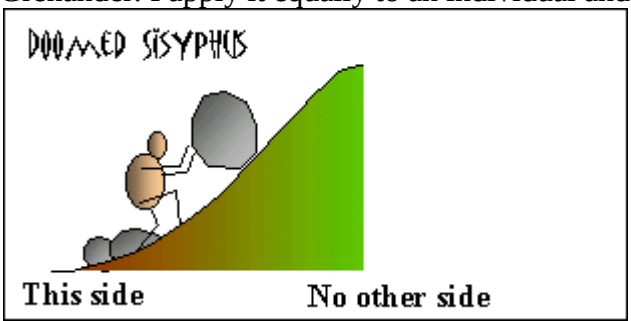
> I have attempted to build a physics that incorporates time at the elementary level. In other words, I want to give a new formulation to the idea of laws of nature: Rather than speaking about these laws as deterministic, I want to express them in a way that involves both probability and "irreversibility" - chance and time. The same cause does not always yield the same effect, either on the macro or on the elementary level.

On a different occasion (1983) :

> The new description of time puts in a new perspective the question of the ethical value of science. This question could have no meaning in a world viewed as an automaton. It acquires a meaning in a vision in which time is a construction in which we all participate.

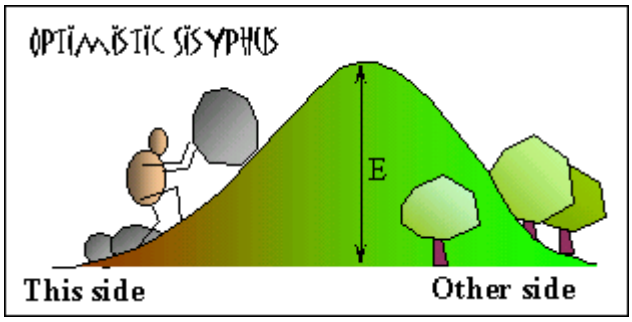
These two quotations, plucked from the Web, in no way can substitute for Prigogine's popular books, as none of my Essays can substitute for printed sources, but they give a taste of both the author's ambition and his existentialist stimulus. Prigogine was interested in the major problems posed by modern philosophy: being and becoming, equilibrium and irreversibility, novelty and boredom, choice and chance—the landscape mapped by Sartre along the travel journals of Kierkegaard.

My personal vision of existence of complex systems comes from Ilya Prigogine and Ulf Grenander. I apply it equally to an individual and the society. Both can be torn apart, fell in love, swing between sadism (of nationalism) and masochism (of multiculturalism), suffer defeat and



intoxication of victory, build, destroy, trade, waste, reform, grow, fell ill, and die.

I have to repeat once again two illustrations from my previous essays.



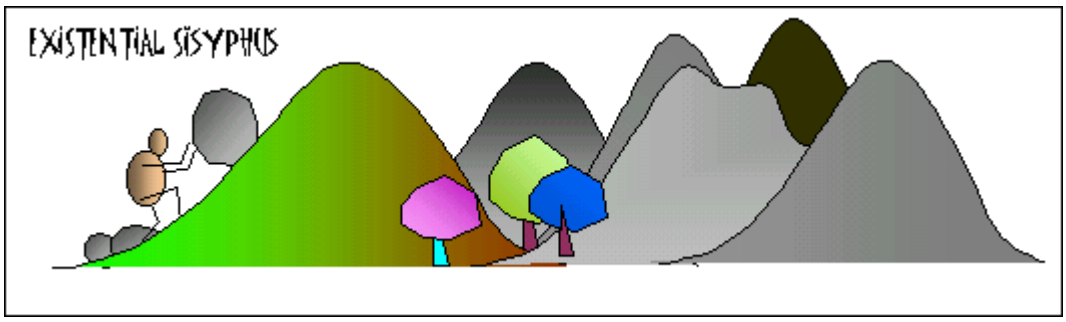
In the mythical Underworld, the doomed Sisyphus has no choice. He cannot change his future. His circular present consists of repeating the same cycle of rolling the rock uphill and following it down.

This picture symbolizes for me the deterministic world where the future is entirely predictable and the laws of Nature are known. Contrary to Camus, he is the common man, a robot. He gets up every morning to do his quote and goes to bed with his stone as the pillow.

In the real world, humans and nations have hope, aspiration, and their own design of the future. An optimistic Sisyphus of the upper world imagines his future as a green valley on the other side of the hill. He spends energy to overcome the obstacle of gravity and reaches the top. He has a good chance to run after the stone toward the cheerful trees where he can finally rest.

As the physical vision of the world tells us, the factor of probability interferes with human will at this point. There is only a chance, with probability from 0 to 1, but usually much less extreme, that the stone will tumble down the other side. This is what happens in the inanimate nature.

My last long picture shows the Sisyphus of the simplified existential vision of life.



The existential Sisyphus has his vision of the other side which can be quite unrealistic, as I tried to show with the color of the trees. Sisyphus is a realist and he knows that there is a largely unknown landscape behind the hill but he believes that he will be able to repeat

his deed, if not at the first attempt, and reach the next valley. New vistas will open ahead, and the same general scenario will be repeated, but not in detail, and these are the limits of human power over the future. Nobody knows which hill will be last. The novelty is the reward for the toil. Contrary to Einstein, God casts dice.

The picture can be interpreted, trans-metaphorized, for example, as the personal philosophy of Don Juan, for whom a woman is just a short stay in a valley and the meaning of life is in the very process of climbing the hill and the novelty of the new vistas. For Don Juan, however, all the distant hills are green and there is no gray color in the palette of the fate.

The picture equally applies to the philosophy of writer, politician, and scientist, with different kinds of accomplishment (not excluding that of Don Juan). The movie *Quills*, however disgusting, carries the idea perfectly.

I see no borderline, however, between an intellectual and a common man. Paraphrasing Ernest Hemingway, the intellectual is a common man who does not know that he is common. I see no reason to abolish the old idea of Aristotle and castigate the common man, as Kierkegaard, Nietzsche (and Francis Fukuyama after him) did. The difference is simply in the abilities, imagination, goals, and the roughness of the terrain. The difference is in detail. The intellectual is as much a sublimation of the common man as compulsive travel is sublimation of watching the TV travel channel.

Two things lacked from the initial general picture of Prigogine's universe, and I believe he completed it in his latest books.

First, it is the phenomenon of competition. Crowds of people are rolling their stones up the same hill and they help or hinder each other. Besides, the valley can house only a limited number of inhabitants, so that the landscape is in a continuous flux, as if it were made of soft rubber.

The idea of competition comes from Darwin. It was elegantly translated into a physical form by Manfred Eigen , a Nobel Laureate (1967) in Chemistry, and, not accidentally, a musician. It became one of cornerstones of the modern science of complexity, the major problem with which is that it is has become very complex.

> **NOTE**: The complexity of the science of complexity can both add to and subtract from the status of science of complexity as mathematoid philosophy of the future, for which science of complexity has no claims. It is a developing and exciting area of mathematics inseparable from computing.

Social competition, in the form it takes in democracy, did not always exist. Even a superficial look at history shows that the precarious competitive landscape is a relatively new phenomenon. In authoritarian societies the absolute majority of people knew their place. I mean here not the competition between a handful of kings or their vassals, but the competition of a large, actually, indefinite numbers of participants, so that I do not dispute Collins' vision (see his "law of small numbers").

Second, it is the concrete difference between people, landscapes, their stones, and their visions of the valley. This—structural—type of vision is completely absent from physics and even from the science of complexity. It is common for chemistry, biology, anthropology, and history. It is also common for everyday life where we never encounter a man or a woman but only somebody with a face, name, gender, voice, and smile, or at least a social security number.

The task of developing the general principles of a theory of differences between individual objects was accomplished by Ulf Grenander in Pattern Theory. Other much less general and, apparently, independent undertakings in the same key belong to Christopher Alexander (**Essay 23**) and Randall Collins, not to mention the entire science of chemistry. The key word here is pattern.

Since I am interested here only in a map of knowledge and not in the knowledge itself, I have to stop here, on the threshold of an immense, exciting, and frustrating area where I was wandering for twenty years as tourist without map.

Existentialism did not develop any consistent and non-trivial ethics. Reading Olson, and, especially, Collins, I asked myself: what is my personal philosophy? Here is a draft.

1. Accept possibility of defeat.
2 Forgive yourself.
3 Hate nobody.
4 Love very few.
5 Believe in simple reasons.
6 Do not go with the crowd.
7 Roll your stone uphill.
8 Your philosophy fits only yourself .

If only I could follow my own philosophy... But then I would be a robot.

NOTES:

1. Quotation from an Interview with *New Perspectives Quarterly* (Spring, 1992).

> NPQ: You don't see a danger in the utopian perspective? Much of modernism was spent forging one utopia or another, which led more often than not to some fairly horrific consequences.
>
> PRIGOGINE: I am more afraid of a lack of utopias. I am afraid of the drying out of incentive. For example, if you think about politics for a moment, life becomes very uninteresting if incentives for conduct are limited strictly to economic exchanges. However, when we bring in the idea of nature, **and visions of the natural world we would like to live in**, or the idea of other civilizations, and

> the relationships we would like to have with them, "politics" takes on a whole new meaning.

2. The masochistic elitism of existentialism seems to have been avenged by the plebeian sadism of postmodernism.

3. Randall Collins occupies my mind even more than Sisyphus. I simply **must** give a sample of his style, which is also an example of physical vision of elite humanitarian world:

> Visualize a small number of particles—three to six—moving through a tunnel of time; each draws energy from its past momentum, renewed and accelerated by repulsion from the other particles. This tunnel is the attention space of the intellectual world; indeed the tunnel is created by the movement of the particles and the tensions that connect them. The tunnel's walls are not fixed; it extends forward in time only so long as the negative interplay of the particles keeps up a sufficient level of energy. As arguments intensify, the tunnel becomes brighter, more luminous in social space; and as positions rigidify, going their own way without reference to one another, the attention space fades.
>
> Surrounding the tunnel are the ordinary concerns of the lay society. Persons on the outside notice the intellectual tunnel only as much as the glow of its debates makes it visible from a distance. Intellectual stratification is represented by distance from the core of the tunnel. The walls of the tunnel are no more than a moving glow generated from within. The trajectories of the particles and the borders between light and shadow are seen most sharply at the center, by viewers situated on the main energy lines. The farther one is from the central zone, the harder it is to see where the walls are, this membrane of relevance for the controversialists inside it. In the half-light of semi-focused regions, it is easy to mistake residues of old arguments for the central issues that will generate the forward thrust of the attention space. Provincials, latecomers, and autodidacts flail in the wake of past disputes but do not catch up with the bright center of energy. (Pages 791-792).

Sorry, I have to cut it. This is what I call a great metaphor!

I think that Collins' general vision is applicable to any kind of intellectual, artistic, and, to a large extent, even scientific production, but, unfortunately, not to the fact that so much, if not most, of art, literature, and science is made by "provincials, latecomers, and autodidacts." Stendhal once noted that one can see well-dressed people in Paris but real characters can be found only in province. Copernicus, Darwin, and Einstein were controversialists.

4. While existentialism considered individual life as object, any thermodynamical approach could be applied only to large ensembles, such as society. Something like thermodynamics of small systems (in the sense of Essay 24), as far as I know, is a wasteland. Nevertheless, pattern theory and social psychology suggest that this could be possible by using probability as measure of energy and energy as measure of probability, correspondingly.

2001

P.S. (2016**)** See the conclusion of **Essay 60**.

Essay 28. On Simple Reasons

I am starting a collection of illustrations of my credo of simple reasons:

Events in complex systems have simple reasons

I half-seriously formulated it at the age of around thirty, listening to long confessions about relationships gone wrong. Watching myself from the inside, I saw that my personal problems seemed to involve a lot of factors. Nevertheless, they all somehow funneled down to a single simple reason that was difficult to acknowledge because of shame or guilt.

We commonly present a lot of reasons, trying to ease the internal pressure of cognitive dissonance (**Essay 8**). If there are so many circumstances against us, our weakness seems justified. This is an example of a simple reason.

With time, I came to conclusion that social life and politics had the same simplicity of deep reasons. This view has a simple reason of its own: an abundance of reasons could paralyze a complex system.

Of course, my questions may not be supported by facts, while the answers could be plain wrong.

1. Why do the Arabs dominate in the terrorist squads?

Because the Arabs suffered military defeat from Israel supported by Americans while other Muslims did not.

2. Why is Tony Blair such a firm supporter of the American policy on terrorism?

Because England suffered bombardments of its territory during WW2. Paris did not. Tony Blair was born in 1953, but in England history is in the air. Pun not intended.

3. Why do the pacifists seem to prevail among the callers on the Public Radio talk shows?

Because the non-pacifists are at work during the day and are pacified by it. The militants who do not work have their own shows.

4. Why has the level of the US television been steadily declining?

Because A.C.Nielsen rating company sends around thick questionnaires that require a lot of time to fill out so that no sensible viewer has enough time to do that. The rating, therefore, reflects only the taste of a small category of TV addicts.

5. Why has political correctness taken hold of American society?

Because everybody has something to sell and wants to expand the customer base.

6. Why is there no peace between Jews and Palestinians in Israel?

Because there is no single continuous border between them. The settlements and disconnected territories are like oil in water: they can be prevented from separation into two distinct areas only by constant shaking. In other words, the border between the two peoples is too long for the area.

The same reason may be responsible for possible perils of globalization. In physical language, the phenomenon is ominously called surface tension. It was definitely responsible for the post-Yugoslavian turmoil.

7. Why is the level of education in many public high schools so low?

Because the teachers are paid while the education is free.

8. Why is that liberalism, in the form of unbalanced varieties of pacifism, primate of equality over distinction, freedom over duty, and minority over majority, spreads so wide in rich Western nations?

Because the liberal believes that he or she personally will profit from the benefits of the liberalism without paying for it. See **Essay 16**. In poor countries, an individual profits from belonging to the tribe or crowd and following the leader.

9. Why is the world fragmenting into ever smaller states on the pretext of national or religious independence?

Because in any independent state, however small, there are a room for the head of state and money for his salary and staff. At the same time, in a smaller state there is a better chance for an average resident to have a friend or a relative in the government. Everybody has something to gain.

10. Tenure at universities was long ago invented and introduced to guarantee academic freedom, including freedom of opinion, dissent, and research.

I do not question tenure, but I have the answer:

Because tenure does not guarantee grants.

11. Is there a simple reason for the anti-war protests after September 11, when the war came not to the other end of the earth but to the homeland?

As Dostoyevsky said, it is easy to love those far away, but it is a challenge to love your neighbor. Even this reason, however, is too complex.

The easiest love is the love of yourself. Young people are afraid of the possible change of the lifestyle, hardships of war, and military draft.

12. What could be a possible reason for educated well-to-do people like Osama bin-Laden and Ayman al-Zawahiri to give up prospects of comfortable life, engage in ultimate violence, and challenge America?

This seems to be the most dazzling problem for many Americans. Are the Arabs made of a different stuff? Are they fervent believers in God? Hardly.

Answer: The prospects of even more comfortable and glorious beyond imagination life in the future.

They could have that life as the leaders of a World Islamic Empire (actually, a kind of Commonwealth) with the center in Saudi Arabia, where the Muslim countries would preserve formal independence but be guided by the custodians of the most holy sites under the gun of their own fundamentalists. Only that game could be worth the candles.

P.S. (2016). The phenomenon of ISIS with the goal of the Caliphate confirms that. Terrorism is pursuit of happiness, what can be simpler?

13. Why do the political opponents unite behind President in times of external conflict?

Because it is not about competing philosophies of spending money.

14. Why cannot the sides in the Palestinian-Israeli and Pakistani-Indian conflicts come to an agreement?

Because each side expects the opponent to be smarter and learn faster than itself.

15. Why is death such an unpopular subject in America?

Because the dead do not purchase Things.

For the same reason, paradise has little attraction. What can you buy there?

16. The US two-party system has been so impenetrable. Why?

Because even a small third party would be the most powerful one in Congress, manipulating the voting balance. To buy it would not be cheap.

17. Why are the books written by patients on their illness, sanity, and recovery in such a big demand?

Because people do not trust their doctors.

18. Why does the opposition to Darwinism find such support in America, the paradise of science, technology, and higher education?

Because whatever is true—creationism or Darwinism—it seems to be about the long gone past and has nothing to do with making money today.

19. Why has the US been holding on to its membership in the United Nations in spite of an evident political and moral incompatibility with authoritarian, clerical, or just egotistic regimes in the majority of the UN members?

Because for a government it is much easier to deal, one way or another, with a powerful leader than with an unrestrained, unruly, and unpredictable democracy, whether outside or in its own country.

20. What is the simple reason for the stock market crash of 2000-2???

The virtual reality is not the same as reality, but it has been all the public could see. In the last ten years of the twentieth century it was as hard to escape the virtual reality as the commercials on network TV. It has been hard enough to find reality, but is much harder to tell one from the other. It is incomparably easier to create the covering-its-tracks and self-destructive virtual reality with computers and the Internet. This reason applies also to presidential elections.

21. What was the simplest reason for the movement against the war with Iraq?

The reason is ideology: life is good, death is bad, war is death, war is bad. To subscribe to an ideology is very simple because any ideology is a substitute for complexity and does not require any specific information as a reason to join the ranks. If seven out of ten of your friends do something, most probably, you will do too. On the contrary, a person in the position of leadership and management—which puts all the friends at a natural distance—must make a decision basing on the sense of responsibility, as well as on tons of secret, incomplete, uncertain, and contradictory information. Ideology is not supposed to go into any details—to spare the burden of thinking is the main function of ideology—and may save and kill with equal zeal.

22. Why was the war with Iraq started?

Because in democracy, with its frequent elections and term limits, only those decisions that could be implemented **fast** have any chance to succeed during the term of presidency. Otherwise, the next guy can steal the success. In the culture of optimism, failure is never a possibility. But if **it happens, you can drop it off at the next guy's door.

23. What is the driving force behind the anti-globalization movement?

The subconscious realization that globalization will erode the Western standard of living and freedoms. One does not need to be a professor of physics to draw a lesson from a hot cup of coffee cooling down in a cold room with no effect on the room. Moreover, somebody will have to be drafted and given a gun to fight for a hot cup of coffee.

All great ideas come not from logic but from subconsciousness.

24. What is the secret of Noam Chomsky's influence, however limited?

He possesses the so rare in the modern world gift of artistic eloquence, which makes you see what is not there.

25. Why is America so much unlike Europe?

At least after the Roman Empire, Europe never knew the phenomenon of open frontier on its land. America never knew monarchy on its soil. With monarchy comes refinement. With the open frontier comes the sense of eternal playful youth. (Is this two simple reasons or one?)

26. Why do they hate us?

As for the Muslim fanatics, the reason is the simplest of all: the negative attitude toward Christians and Jews is right in the suras of Koran and one does not need even ask why. The same was with the Communists: the expropriators should be expropriated. But need no despair. Let us distinguish between human thought, never directly observable, and its display in speech and behavior. When I lived in the Soviet Russia, I never saw a sincere America-hater, although to be one was required by the Communist faith. Voltaire: "One great use of words is to hide our thoughts."

27. But why do we hate ourselves?

Because by ourselves we mean personally anybody but ourselves.

28. Why do we fear death so much in America?

Not so much because we fear the loss of our life—this is unavoidable and even sugar-coated by religion—but because we lose all our possessions, contrary to the principle: the more you have the more you will add to it. This is really the end of the world.

29. **Why do we deny an easy death to other people?**

See **Simple Reason 27**.

30. Why did I, an independent, voted in 2000 for Bush II, with all my democratic and liberal sympathies?

The answer is: TV. The TV screen is flat and it shows only the surface of things. Not only do we vote for actors instead of real leaders, but we forget that the script precedes the play in TV while the play runs ahead of the script in real life. There is a big consolation: only half of the voters were as stupid as I was. Sorry! Hey, but now our guys have better hair! I swear to make the same mistake again (now = 2004).

31. Regardless the previous, what could be a possible valid justification behind the decision to attack Iraq?

I am a chemist and I know that chemical technology is like a cookbook: it contains all the necessary information for making a pizza. It is absolutely of no importance whether somebody has a stale pizza in the form of the stockpile of chemical and biological weapons. If there is a technological recipe, the meal can be made from scratch. Chemical and biochemical equipment is essentially the same as pots and pans in the kitchen. Surprisingly, nobody, as far as I know, mentioned that. Not even Bush himself. So, next time, do not show a vial with white powder. Show a textbook. But the vial looks better on TV. Do not generalize it over pizza: it looks better than the cookbook.

32. Individualism is in the very foundation of American spirit. Nevertheless, millions of Americans worship pop gods, work like ants to keep up with the Johnses, and build the web of connections. Why?

Individualism is incompatible with large crowds of people fighting for a limited resource. An individual has no chance against the crowd, whatever the movies claim. America started as a scarcely populated country. Self-reliance was a necessity. Today it is just a myth because only the resources of pollution are unlimited.

Besides, individualism and totalitarianism are the opposite ends of a continuous scale.

33. Why would some people in America want to weaken, if not eliminate, Social Security?

They are true American patriots. Without SS there will be more poor people, the USA will depend less on cheap foreign labor and outsourcing, the traditional American values will be strengthen, and America will stop rolling downhill or falling apart or both.

34. But why do the same people want to strengthen religion?

Well, it is obvious. If you make the government weaker, you need a strong hand anyway to keep the flock together.

35. Why is religion so wide spread in America?

Because it has become a technologically advanced industry. It may not be opium for the people anymore, but it is certainly like soap for the soul. This soap business is not taxed.

36. Oh, no! Not everybody has dirty soul! Why are people genuinely attracted to the places of worship?

Automobile has been dispersing and scattering people for a hundred years. The place of worship pulls them together. It has no wheels.

37. Why do we in the modern West have problem with any war? War has been considered normalcy for millennia.

It is the identification with the enemy. We are humans, they are humans. We become our own enemy.

38. But why is that the right wing has no qualms about war?

To have no qualms is the definition of the right wing. Therefore, the ultra-left wing of the left wing is the right wing.

39. In 2004 George W. Bush was one of the most vulnerable candidates on memory. Why was he elected?

Because the majority of voters cast their ballots for him. But it is a big mistake to believe that the American President is elected by the majority. In fact, the President is brought to power by the power of voters (P) which is the number of potential voters for him (V) times the turnout (T), i.e., fraction of them who actually comes to the polls :

$P = V \times T$. This is not quite simple, but still a reason.

40. Why was suicidal terrorism successful in New York?

First, very complex reasons, just so that you could see how simple the simple reason is.

The branches of intelligence did not communicate, the Congress had little supervision over the intelligence, the suicide bomber is the most perfect weapon ever, endowed with human intelligence, blah-blah-blah.

Now the simple reason. The American civilization, oriented toward maximal business freedom, enhances any business activity fueled by money. Whatever you want to do, sell pornography, play Shakespeare, build a nursing home, or blow up the White House, the

system will work for you until the moment people discover it works against them. This moment comes *post factum,* which is rather late. Modern terrorism is a social parallel of the viral infection, in which a simple low life form uses the sophisticated biochemical apparatus of the cell to destroy it.

41. Forget the reasons! How can we protect ourselves against terrorism?

Terrorism is similar to AIDS. That the virus reproduces and multiplies itself by killing cells while the terrorist dies in the act, does not matter. This leaves us nothing by a social condom to prevent the terror-AIDS. This is why Israel is building the condom wall. All the more, democracy has always suffered some weakness of immune system. But the vitamins won't help.

Am I right or what? Left?

42. If the reasons are always simple, why do we mess everything up so often?

The reasons are simple, but the solutions are complex. To find out the reason takes one mind, but to implement a solution takes many. In spite of all the drama, family law somehow works because it involves very few people.

August 31, 2005.

43. Pope John Paul II was a modern man, highly educated, intelligent, and well familiar with the unstoppable pace of history. Why did he so stubbornly resist any liberalism in birth control?

Simple reasons are always deep and hidden. Exactly because of the reasons listed above, he understood well that with the unstoppable pace of global history the Christians, and the Western Civilization with them, have the worst chances to survive unless there is a drive to multiply. Things and goods eat children. Things and goods have no faith. But children may have it. So, we have to start with children.

44. What is the simple reason behind the European Union?

EU means a discovery of a second America in Europe.

Modern capitalist country can be rich if there is a reservoir of poverty that maintains the gradient between rich and poor. This gradient has been supplied by the immigrants from former colonies. At some point the leaders of Europe realized that sooner or later the infertile Western Civilization would be absorbed or at least eroded by the influx. As the Communism had fallen, the gold mine of the East European poverty, which is Christian, White, and therefore Western, suddenly came to the surface, wide open for the continental drive to the East.

45. Why are people rarely honest about simple reasons?

Money does not smell. Simple reasons do.

47. Why did the USSR fall?

Because designed for isolation from the world, it slightly opened borders to goods, people, and ideas, in other words, to globalization.

A big misconception about globalization is to ignore that national constitutions and laws have no global power. The strongest wins. Globalization is indeed a global gamble. The most likely political outcome is the competition between the democratic camp and the strongest ever authoritarian camp, with an axis China-Russia-AIC, where AIC stands for Authoritarian Islamic Countries.

48. Why could globalization be a threat to America?

Because the Declaration of Independence and the Declaration of Dependence (i.e., globalization, outsourcing, reliance on external energy and talents) do not seem to walk hand in hand.

49. Why hydrogen as source of energy is a hoax?

Because before hydrogen can be combined with oxygen (i.e., burned), releasing energy--about 3.75 times more than the same weight of gasoline--it must be obtained by splitting water into hydrogen and oxygen, which requires **exactly the same energy**. Where would it come? Hydrogen is an environmentally friendly, although even more lawyer-friendly, "form of energy," in the same sense as gasoline, but **water is not a source of energy**. There is no free hydrogen on earth.

NOTE: It has been known for 150 years that coal and water can be converted into a mixture of carbon monoxide and hydrogen ("town gas").

50. Why are so many countries ahead of America in public education?

Because education there is part of culture. Culture is part of national identity. National identity is something one cannot sell.

In America, culture is part of business. Entertainment is part of culture. Education becomes part of entertainment. Entertainment is part of culture. Culture is part of business. And so on.

51. Why is it difficult to restore education in America?

There is no single simple reason, but there is a simple reason for the absence of a simple reason.

American history is radically different from the history of most developed countries because it was shaped by the phenomenon of open frontier. When you are on the move to a new life, culture is a means, not the end.

52. Why can a country of, say, 300 million lose a war against a country of 30 million?

This is simple: if the war is accompanied by a Cold Civil War, the 300 millions are like fighting another 330 millions. This levels the playground.

53. Why is freedom of religion unlike any other freedom?

Because faith is sacred. With all your freedom of speech, you cannot argue with faith.

54. Why is America in the state of a Cold Civil War?

Because the entire historical situation in the world, together with America's place in it, is changing. Big historical change runs always in an unknown and unexpected direction. The Great Cold Civil War is the evidence of the ambiguity of the data and the lack of consensus in their interpretations. It is like a debate before a great scientific discovery, minus the civility of science, plus the choice of only two colors for military uniforms.

55. But why is the Cold Civil War still cold?

Nothing unites people as much as human nature and nothing separates them as much. Well, humans have not only minds, but bodies, too. One cannot put either the Bible or the multiplication table on the dinner plate. The stomach calls for evading extremes, expanding the customer base, and getting along with others. What naturally eases the tension is the spatial segregation: North and South, East and West, City and Suburbs, Red and Blue. Unfortunately, the longer the borders, the more surface tension (see **Simple Reason 6**).

56. As it has been often noted, the conservatives and religious right are usually well organized and vigorous while the liberals seem sloppy and careless. Why?

Liberals are rationalists who believe, not always rationally, in reason, logic, and proof. They think that the benefits of personal freedom are as self-obvious as $2 \times 2 = 4$. You cannot fight for the truth of arithmetic because it is the universally acknowledged truth. On the other side, people quite irrationally worship different religions and ideologies, none of them ever proven to be better than the other. To convince somebody in an idea beyond proof needs some motivation, training, organization, eloquence, and a good deal of reason. Money, too.

57. Why are people unable to draw lessons from history?

Those who could seriously warn others are actually already dead . Those who had survived could draw only a lesson of optimism.

58. Why are we insatiable consumers?

Because the more we have, the more we have not. For example, if we have a car, we don't have a better car. However, if we have a car and a boat, we don't have a better car and a better boat.

September 10, 2005

59. Why is America so careless?

The terrorists are not stopped before 9-11, the soldiers in Iraq are not protected in their vehicles, space shuttle Columbia is a victim of neglect, New Orleans is not prepared against the flood, etc. Why?

This is an eternal question well beyond American experience. Why do people make costly, stupid, tragic, but predictable and avoidable mistakes? To answer this question, let us assume that people do not make such mistakes. Could there be any simple reason for that? Obviously, not, which answers the question. Something always goes wrong in a complex system. But see **Simple Reason 71**.

60. But why all that falls on a single presidency?

Probably, the president is too simple for the complex system.

61. Why is our world so complicated?

Why, indeed? Each elementary act of our life is simple: making a choice between two alternatives. The complexity comes only from the number of binary choices, which leads to a staggering number of combinations.

The presidential election is comfortably minimalist, like the choice of soup or salad. Most people stick to their habits, unless somebody persuades them that one is better than the other.

62. Why should we watch out for simple people in the government?

Beware of simple people: they have only one goal. Most probably, it is different from yours, while a complex person may have a common ground with you as well as with your neighbor.

63. Why then do we elect a simple person to lead a complex system?

This is natural if we don't like our neighbor.

64. Whatever history will say about George W. Bush, he has exacerbated the antagonism between parts of American society along many lines. There are plenty of reasons, but what is the simplest?

President's priorities have been to serve the team of people who ensured his election first, his party second, and the people third. To put it differently, the reason is the centrifugal order of priorities: from himself to the periphery. Great leaders do it the other way around, so that they have to unite the periphery first.

65. Why do we cherish democracy so much if it does not prevent large scale blunders?

In democracy you can blame only yourself. If so, the burden of guilt per person is really tiny as compared with the scale of a tragedy.

66. Why is equality impossible?

All have the same value, therefore I have the same value. But it does not mean that you have the same value as I.

67. Why is the US Supreme Court so often split if the US Constitution is remarkably concise and clear?

Because the US Constitution is a result of an intelligent design, while the real life is result of evolution.

68. Why do we need to know "why?"

Power comes from knowledge but knowledge comes from curiosity.

69. What is the simplest reason behind the resurgence of militant religious orthodoxy in various parts of the world?

A chronic dissatisfaction with the government. God as commander-in-chief could not fail.

70. Why is there no link between money and culture?

We believe in the absolute power of money, which can bring people to the moon, win a war, feed the hungry, solve a problem, and elect a president. We are blessed with the singularity and transparency of money. Money is the simplest reason of all. All

currencies are mutually convertible. The most irrational thing in modern society is not to be tempted by money.

Culture by definition is irrational, like the deer's antlers and peacock's tail. This is why we are blessed with the diversity of the world. But this is why there is no link between money and culture, unless by culture we mean the culture of money.

September 23, 2005

71. The world becomes more complex, but our knowledge grows and people are still assigned to manage limited projects. Why do people in charge so often lose imagination and fail as result?

Because people who are in charge today have been living all their lives in the age of TV and smartphone, the supreme killers of imagination. No wonder, both Bill Clinton and George W. Bush have demonstrated the loss of imagination on catastrophic scale. See also **Simple Reason 59**.

72. If individualism is an essential part of American mentality, why is religious, social, and racial identity, i.e., belonging to a larger crowd, is equally important?

The question should be reversed: why do we believe in individualism if collectivism is the most ancient human attribute?

Because individualism is a myth. Myth always contradicts reality, but it is fit to be believable.

73. Why is the phenomenon of open frontier so crucial for American history?

Because it made the myth of individualism a temporary reality.

74. Why is the concept of a single superpower senseless?

Because the power must be proved in the contest with the equal in the same weight category.

75. Why is America so anti-intellectual?

(Is it? It is fairer to ask why it seems anti-intellectual to the intellectuals. Anyway, the intellectuals have restated the question in affirmative numerous times.)
Because ideas cannot be taxed. This question leads to one of the most fascinating contradictions in the modern psyche. While few things are as repulsive for us as tax, anything that cannot be taxed is regarded worthless.

76. Why has the war with Iraq failed the expectations of its initiators?

The simplest reason of all is incompetence. Unless you are Noah, you cannot be required competence regarding unique catastrophic events, like flood in a big city, but guerilla insurgents have been fighting regular armies throughout the entire human history, so that there is no excuse. Paradoxically, there could be an excuse for the final failure: it happens all the time.

November 28, 2005

77. In America, financial achievements are typically glorified and revered more than intellectual ones. Why?

Brains are from God, but you have to earn money on your own. You cannot lose your intellectual achievement, but you can lose your money.

78. Why is the two-party system flawed?

Because as "there is only one step from the sublime to the ridiculous" (Napoleon) , there is only one step from the two-party to the one-party system. Fortunately, we are watching a misstep.

79. Why is religion successful in operating large masses of people?

Because it possesses a powerful authoritarian means of control: supervision of open rituals. On the contrary, in a democracy the only mass secular ritual of voting is secret and cannot be easily controlled.

80. Why would some people stubbornly deny a failure?

It makes sense. When you have lost so much, some resilience looks like a gain.

81. For many leaders the loyalty of their inner circle is of a crucial importance. What could be the reason?

They have something to hide.

82. Why do we as a nation need strong and invincible enemies?

Because if an enemy is defeated, its features are kosher to borrow.

July 24, 2006

83. Why has Israel no chance to survive against the militant Islam?

Because of the immense numerical advantage of the enemies. Whaaat? Wait!

84. Why has Israel good chances to survive against the militant Islam?

Because of the very nature of history: historical event is the one you do not expect.

85. Why is America in no danger of undermining the Constitution and transforming itself into an authoritarian society?

Because of the great distance between American democracy and authoritarian rule. The Constitution was designed to make such jump impossible.

86 . Why is America in danger of undermining the Constitution and transforming itself into an authoritarian society?

Because any great distance can be passed in a sequence of small easy steps.

See **APPENDIX 4**

January 11, 2007

87. Why would George W. Bush go against the predominant mood and expectation of the country and escalate the war in Iraq?

Because he hopes to be stopped by the Congress and have an excuse at the trial of history.

88. Why is the growth of income inequality in USA dangerous?

Because people disappointed in social justice tend to elect demagogues. Examples galore in space and time.

2008

89. Why are the conservative talk shows so numerous while the liberal ones almost non-existent?

The conservative is not curious about the world because he (or she) knows what he wants and hates. The conservative is easy to be pleased by the echo of his thoughts. The liberal knows only what he hates, especially, being told what to do and what to think. He is

curious about what he could possibly like. There is not much.

90. Why has no traditional mainstream candidate come to the final stages of the presidential race of 2008?

The three main competitors are senior citizen, mixed race man, and woman. The traditional mainstream have decided to wait out until the cleaners do their job on the incredible mess after the previous run-of-the-mill president.

APPENDIX

1. My theory belongs to a whole category of similar (but not identical) principles, the founder of which was William of Occam (or Ockham), who lived in the 14th century. His position became known as Ockham Razor:

> **Entities should not be multiplied unnecessarily**

There is also Hanlon's Razor :

> **Never attribute to malice that which can be adequately explained by stupidity**

I have to mention also theory of simple reasons in Artificial Intelligence, but I do not know what it is.

2. A good example of complex reasons:

> It remains for us to explain the relation between causes and motives in the everyday case in which they exist side by side. For example, I can join the Socialist party because I judge that this party serves the interests of justice and of humanity or because I believe that it will become the principal historical force in the years which will follow my joining: these are causes. And at the same time I can have motives: a feeling of pity or charity for certain classes of the oppressed, a feeling of shame at being on the "good side of the barricade," as Gide says, or again an inferiority complex, a desire to shock my relatives, etc. What can be meant by the statement that I have joined the Socialist party for these causes and these motives?
>
> Jean-Paul Sartre, *Being and Nothingness*, Part Four, Chapter One, I.

A possible simple reason is in "etc.": I was promised a position of a salaried functionary.

A simple reason does not leave any further "why."

3. After picking **Reason No.10**, I got a feeling that I had read something obliquely relevant. And I found it:

> There are high welfare categories as well as low ones. Some professors work hard, said the Dean. Most of them do. But a professor when he gets tenure doesn't have to do anything. A tenured professor and a welfare mother with eight kids have much in common....
>
> Saul Bellow, *The Deans December*, 1982, Chapter 18.

Everybody needs grants, tenure or not.

4. Comments on Simple Reasons 83 to 86

> Two Jews came to the Rabbi and asked to solve their dispute. The Rabbi had listened to the first Jew and said: "You are right." Then he had listened to the second Jew and said "You are also right." But the Rabbi's disciple intervened: "It is impossible for both to be right!" "And you are right, too, my friend," the Rabbi said.

2001-2008

Essay 29. On Goil and Evod

[philosophy, war, existentialism, pacifism, liberalism, humanism, terrorism, ism, ism, ism, death,]

I thought I would never return to philosophy after Essay 27, *The Existential Sisyphus*, but it did not let me go. I can hear philosophy and history clashing on the radio waves.

In Franz Kafka's famous story *The Metamorphosis*, Gregor Samsa wakes up and finds himself turned into a giant insect. He knows that he is not an insect, but his family can see only his appearance. Gradually, the reality of his new condition becomes part of his self-perception, and the reality of his past and future conditions becomes part of his perception by the family. In the end, both sides seem to lose the sight of the past. His death, partly violent, puts an end to the entire episode.

In Kafka's short novel *The Trial*, Joseph K. wakes up and finds himself involved into a bizarre and dreamlike—Kafkaesque, as we now say—court trial, the reason of which remains unknown. The situation is resolved in the same way as in *The Metamorphosis*, but more violently.

Kafka's creations are considered examples of the existential thinking. The problems arise from the perception, true or imaginary, of life as something charged with stress, contradiction, nightmare, and dread.

The difference between Kafka and philosophical existentialism is that Kafka's situations are obviously artificial and impossible in real life. They are metaphors, while existentialism regards actual human condition as naturally unnatural.

Some, like Walter Kaufmann, deny that existentialism is a philosophy:

> Existentialism is not a philosophy but a label for several widely different revolts against traditional philosophy. (*Existentialism: from Dostoevsky to Sartre*, edited by Walter Kaufmann, Meridian, 1975. Introduction).

This seems rather confusing. The "revolts" are numerous and voluminous books. How can a non-philosophy revolt against philosophy by unrolling large texts that look like philosophy, read like philosophy, and are written by philosophers?

Here is an imaginary situation where the fantastic element is absent.

A human being with initials J.K., unlike inanimate things, perceives himself as ☺. J.K. is also perceived by **other** human beings. Each of the others has his own image of J.K., for example, M.N. perceives J.K. as 😐 . This is not a **true** image, J.K. insists, because it lacks the self-image of J.K., which is part of the total **truth**. The total is larger than either ☺ or 😐 .

The problems of J.K. do not end here because religious, legal, and philosophical **systems** regard all humans as equal under a certain religion, law, and philosophical system. Whether the individual is called J.K. or M.N., or A.B., what he thinks about himself, the system, and the others, and what the others think about him—all that is utterly irrelevant for the system. An ideal democracy does not care at all. The law, however, may hold J.K. as ☹ for tax evasion.

Moreover, there are new questions. Do ☺, 😐, and ☹, which are nothing but appearances, have anything behind them that does not depend on who is looking and from what position? When J.K. is looking at his finger, is he aware of his looking at his finger? And if you answer *yes* to a question like this, then you have to be able to answer *no* to the same question because if you say *yes*, you automatically assume that *no* is also a possibility. Is your own existence a possibility or necessity? And so on. An infinite sequence of philosophical questions looks like the infinite mutual reflections of two opposite mirrors in each other.

What is the **truth**? Has the individual any freedom while being boxed into the system together with the others and a handful of intellectual Styrofoam beads? Has he any individuality? Is his existence authentic or enslaved by the system and the others? What system is true? Which answer is false?

Those are examples of questions modern philosophy considers. Remarkably, a particular philosophy finds itself in the same predicament among other philosophies as J.K. among people. It is scrutinized by other philosophies, as well as by the current predisposition of the society that may or may not give a damn for this or any other philosophy at the moment and for that matter for the truth itself, not to mention the individual. As Karl Jaspers said about philosophers, "We can thereby read their works as if all philosophers were contemporaries." (quoted from Kaufmann).

As an illustration of what a philosophy can say on the subject, I would like to quote Jean-Paul Sartre:

> What appears in fact is only an aspect of the object, and the object is altogether in that aspect and altogether outside of it. It is altogether within, in that it manifests itself in that aspect; it shows itself as the structure of the appearance, which is at the same time the principle of the series. It is altogether outside, for the series itself will never appear nor can it appear. Thus the outside is opposed in a new way to the inside, and the being-which-does-not-appear, to the appearance.

> Similarly a certain “potency” returns to inhabit the phenomenon and confer on it its very transcendence—a potency to be developed in a series of real or possible appearances. (*Being and Nothingness*, Introduction, I).

Over 700 pages later, close to the end, the text goes:

> The "mine" appeared to us then as a relation of being intermediate between the absolute interiority of *me* and the absolute exteriority of the not-me. There is within the same syncretism a self becoming not-self and a not-self becoming self. (*Being and Nothingness*, Part Four, Chapter Two, II.)

And in the conclusion, one finds:

> But the principal result of existential psychoanalysis must be to make us repudiate the *spirit of seriousness*. For the spirit of seriousness, for example, *bread* is desirable because it is *necessary* to live (a value written in an intelligible heaven) and because bread *is* nourishing. The result of the serious attitude, which as we know rules the world, is to cause the symbolic values of things to be drunk in by their empirical idiosyncrasy as ink by a blotter; it puts forward the opacity of the desired object and posits it in itself as a desirable irreducible. (*Being and Nothingness*, Conclusion, II).

The fact that somebody like myself has a deaf ear for this kind of philosophy means no more than somebody's ridicule of classical music. Philosophy requires hard work and love from the student. As Karl Jaspers noted, "A great philosopher demands unrelenting penetration into his texts" (from Kaufmann, again).

As if anticipating the serious unseriousness of Sartre and Heidegger , Kafka makes the sister of Gregor Samsa in *The Metamorphoses* feel a great relief after the remnants of her former brother are swept away. She returns from the metaphor to life:

> And it was like a confirmation of their new dreams and excellent intentions that at the end of their ride their daughter sprang to her feet first and stretched her young body.

I have been interested in philosophy since my youth, but I stayed mostly on its threshold. Looking inside the vast hall of philosophy, I saw its general map and design but I could not find there anything more worth of hard work than my immediate occupations. In competition for my time, philosophy used to lose. But my curiosity and the teenager's secret love from afar have survived the years.

I believe today that philosophy is a form of art. It is the art of questioning.

Philosophy does not give any "true" answers.

For example, the question "What can I know?" immediately poses the question "Can I know what I can know?" which in turn branches into:

"Can I know anything?"
"What is I?"
"What is to know?"
"What is anything?"
"What is question?"
"What is answer?"
"What is 'what is?'"

And finally, somebody asks again the old and completely justified from the philosophical standpoint question "What is *is*?" and gives the answer in the form of a big and obscure book entitled *Being and Time*, as Martin Heidegger does, or *Being and Nothingness*, as does Jean-Paul Sartre. It is a serious question. "It all depends on what *is* is," as Bill Clinton put it.

It looks like a minefield. Wherever you step, new questions explode in a circle around you.

"What shall I do?" another philosophical question sounds. As soon as I know what I shall do, I lose all my freedom to choose, there is no way back, and I am my own obedient slave. Any answer kills the question and dies of starvation.

Philosophy is as true as any art: it cannot be false. It is not to be taken too seriously. Its medium is language. The language is regarded as nature or model, and philosophy paints a picture enlivened with the chiaroscuro of meaning and historical perspective. The picture is framed. It seems that we could understand everything if the picture were an inch longer and wider. The secret key must be right on the edge, under the frame. We look at the other side, but there is no help.

Both art and philosophy have been moving ever farther from the surrounding world and its mundane questions and images. Both modern art and philosophy invent their own building blocks and erect amazing structures from them.

I see even some similarity between postmodernism and pop-art in the selection of blocks from the fringe of real life. It could be a calculated or subconscious desire to go back, down to the primeval dirt littered with elephant dung and to the very beginning of art and philosophy. But it could also be the simple drive for novelty, which is the locomotive of business.

Like any art, philosophy influences our life in very subtle and intricate ways, even if we do not read Plato and Sartre, because it softly and sporadically influences literature, visual art, and even science. It does so by stimulating thinking, disseminating new metaphors, and scattering them over new intellectual lots. The questions are the seeds of some answers on the new soil, especially, in humanities, but they mostly generate new questions. The philosophical production is like the acorns: there are plenty of them but only a few or none grow into new oaks. It is a mental game, a sport, where you play

against Aristotle and Hegel. As soon as some philosophy is proven true, philosophy will end. It is like to proclaim the San Francisco Giants the champions from now to eternity.

Like any art, philosophy is a separate world that recruits its fans from both laymen and professionals, some of whom build majestic shrines on the Web: to Kant , existentialists, Spinoza, Michel Foucault, etc., which is impossible to do without love.

The main attractions of philosophy are not just the complex beauty of its evolution and exhausting difficulty but also that you can study it all your life and still discover something new. Philosophy shares this type of attraction with nature, science, art, children, and even pets. Philosophy is a source of fresh surprise. It is like an experienced, generous, and unpredictable partner in love.

Philosophy is a complex non-equilibrium system that never stops evolving.

From the point of view of substance, it makes as much or as little sense as baseball, but certainly makes less money. Nevertheless, the stars of philosophy are recognizable brand names: Aristotle is "a full service Internet and interactive multimedia design and consulting firm," HEGEL is a "provider of cutting edge audio technology" and Descartes "powers the next generation of collaborative logistics management on a global scale, providing customers with Internet-based capabilities to optimally manage nChain processes." There is even Spinoza® the Bear Who Speaks from the Heart™: "He is not only a soft, cuddly teddy bear who begs to be hugged, but a carefully designed, dynamically effective resource tool" for children with chronic illness.

Somebody still bets his money on philosophers' fame. Philosophy still offers consolation. This is lovely.

I intuitively believe that philosophy is converging with science exactly where Randall Collins (see **Essay 27, The Existential Sisyphus**) anticipates it happen: on the grounds of abstract mathematics, or, to be more accurate, on the grounds of the science of complexity. The peculiar property of this kind of science is that it cannot make a detailed prediction concerning large complex systems. It is very abstract and general. It is glued to computers. This inherent fusion of chance and necessity and the inappropriately strong humanitarian perfume that science of complexity wears makes it suspicious in the eyes of traditional cool-headed physical sciences as well as humanities. But it really tells something new.

> We are now approaching the end of the twentieth century, and it seems that some more universal message is carried by science, a message that concerns the interaction of man and nature as well as of man with man.
>
> Ilya Prigogine, *Order out of Chaos*

I believe that Kant and Hegel will be sooner or later reevaluated in terms of science of complexity and found remarkably prophetic for their time and translatable into modernity. Approached from behind and taken by surprise, philosophy will be also

analyzed from the point of view of psychology and sociology, and this process has already started.

Quantum physics, too, deals with indeterministic behavior of microscopic objects, for example, electrons and atoms. The dramatic difference is that what is going to happen to an individual atom of radioactive element is by no means a matter of life and death for us. On the contrary, the behavior of a large number of radioactive atoms can really be a matter of life and death, but it is statistically predictable.

The behavior of a large complex system, like society or individual, is never completely predictable in principle. Science merges with philosophy when science becomes too general and vague in predictions, too unserious, while philosophy becomes concerned about answers more than about questions.

Somebody, probably, has already said all that.

There is a particular and quite mundane problem that prompted me for this recursion.

The society, like individual, can find itself entangled in philosophy because there are other societies and because abstract systems of beliefs float like clouds over the earth, sending down rain and lightning.

Here is an exemplary problem.

We have to respond to the actions of another society. Violence is **evil**. We cannot use violence in response to violence, can we? Being the object of violence is bad. Inflicting violence is bad. Not to respond to violence with violence means a lot of harm. When we look from inside, we are victims. When we look from outside, we are both victims and perpetrators. When we ask the others, we are perpetrators.

Where is the truth?

The truth is, probably, in the scale of priorities, similar to the Confucian scale of values (**Essay 13, On Numbers**). The big difference between philosophy and life is that philosophy, unlike the deli department in a supermarket, gives no line numbers. The classical philosophy does not distinguish between individuals, while the modern philosophy says : "It's all up to you, buddy."

The individual has to define his or her personal topology (**Essay 24**) and evaluate the distance to family, friends, nation, its various constituents, the perpetrators, and their own neighborhood. This is a dirty business. It is like choosing between two of your children.

In the days after September 11, I heard it many time: a caller to a talk show or a participant in a discussion asks the question: How can we kill innocent people in response to terrorist murder of our own innocent people? We will be as **evil** as they are.

I can never forget how thirty years ago I discovered in a library a dusty volume of a complete 100-volume edition of Leo Tolstoy's writings. It opened in the middle of Tolstoy's article in which he, during the Russian-Japanese war of 1904-1905, preached surrender of Russia to Japan because the loss of life was much worse. It came as a shock and it still bothers me as a kind of cognitive dissonance: how could Tolstoy write that?

The discussion about violence illuminates a real chasm between action and reflection, the same problem that occupied Shakespeare in *Hamlet.* Philosophy has always been regarded as escape from real life. Leo Tolstoy was a big detractor of Shakespeare.

The laws of the world inside our head are completely different from the laws of the real world. It does not rain in our brain. There is no wind, no tide. Instead, it is ravaged by emotional tornadoes and earthquakes of imagination. We can imagine anything, but only a few scenarios have any chance of realization. The world of our mind is like the world of sci-fi movies or MTV. This is why there is a deep divide between the subjective picture of the world and the objective one. From the inside, we see ourselves as the **good** victims of the **evil**. From the outside, brought up on the relativist culture, we can see the fight of the equals. The fog of reflection stops us cold.

The problem, as I see it, is thinking in terms of **Good** and **Evil**. It is obvious that we regard the terrorists as **evil**. It is equally obvious that they see us **evil**. They are violent. We are violent. It is a logical impasse, unless we believe that our violence is justified because it is ours, or no violence is justified and we have to surrender to terrorists and satisfy their demands, or something else.

Thinking in terms of **Good** and **Evil** implies that there is a powerful heavenly protector of **Good**. The other side, however, thinks so, too. This is religion.

To be or not to be? This question is a step ahead from "what is to be?" Still, it is philosophy.

Once again, philosophy, like art, is not about truth. Violent conflict is not about philosophy, it is about ideology (**Essay 24**). Our personal position is not even about ideology, it is about simple reasons. (**Essay 28**). The simple reasons are about life, health, freedom, and happiness. They are about instincts: the id.

Pacifism is a perfect ideology in times of peace. In times of conflict it faces the same problem that any existential philosophy does: the questions have no answers. They are lost in the Ping-Pong reflections between mirrors.

Is there any other source of belief capable of supporting some of our basic instincts against others?

Fortunately, philosophy has a great rival: the deep and dark instincts of our body. Both the instincts and philosophy, however, have a great common rival. The society calls it history. The individual calls it experience.

There is some delicate irony is in the fact that the some existentialist writers regard individual history as the true essence of human being.

> Man is what has happened to him, what he has done. Other things might have happened to him or have been done by him, but what did in fact happen to him and was done by him, this constitutes a relentless trajectory of experiences that he carries on his back as the vagabond his bundle of all he possesses. (José Ortega y Gasset, *History as a System*. Quoted along Walter Kaufmann.)

History, unlike philosophy, is a search not as much for questions as for the answers in the form of facts that can be verified, as in science. Individual and national history is the answer to the question what an individual and a nation are in fact, not in reflection. History of ideas includes also the history of reflections. We ourselves, as well as nations, corporations, and systems, can use history as a single mirror and learn something from studying our moles and wrinkles through the optical, not philosophical, reflection.

The peoples and nations that had been torn apart from the inside in the moment of crisis and showed weakness instead of an ultimate collective will used to be defeated. The peoples and nations that acted upon the urgent needs of the moment (when the distinction between **Good** and **Evil** is locally clear) used to win. As in any act, transition, and change, victory is never guaranteed. Without action, however, the defeat under assault is guaranteed.

Winston Churchill is still my hero of the century.

Philosophy is a paralyzing force if not opposed by action. Our body wants to live, whatever our mind says. Our mind says that only a deadly risk might give our body a chance to live. Our mindless emotions may run ahead of the mind and push us toward action before we run the calculus of chances. The real history is complemented by the imaginary history of humankind in art and literature, religious and secular: the culture of the time.

I came to the appreciation of history at a later age, around forty, when I realized that I was in the middle of a great historic transformation of Russia. When I started searching Russian history for answers concerning its origins, reasons, and prospects, I found them. In American history I find even more answers than I have questions.

One of the lessons I drew from history is the futility of such terms as **Good** and **Evil** as universal categories. Neither science nor history knows what they mean. If I know what they are, I know it from my culture.

In his Essay I:31, On the Cannibals Montaigne seems to speak like a multiculturalist and relativist:

> Now, to return to my subject, I find that there is nothing barbarous and savage in this nation, by anything that I can gather, excepting, that every one gives the title of barbarism to everything that is not in use in his own country. As, indeed, we have no other level of

> truth and reason, than the example and idea of the opinions and customs of the place wherein we live: there is always the perfect religion, there the perfect government, there the most exact and accomplished usage of all things.

In time of war, however, a new set of values takes precedence:

> Anyway, whether there is a case of ignorance so crass and of cowardice so flagrant as to surpass any norm, that should be an adequate reason for accepting them as proof of wickedness and malice, to be punished as such (Montaigne, Essay I:16. On Punishing Cowardice).

Montaigne fought as soldier. So did Socrates and Sartre (in the Resistance).

From the point of view of history, there are always two opposing sides, **Goil** and **Evod** rather than **Good** and **Evil**.

GOOD + EVIL → GOIL + EVOD

In time of the conflict, however, there is no history. History is in the making. It is only for a relatively short transition period in history that one side violently, cruelly, and unstoppably advances without opposition. Then we clearly see the sides as **Good** and **Evil**. In response, we simply take pragmatic steps based on what we are, i.e., on our own experience, if we are blessed to live in a society that can afford such choice, or go against the society if it does not, or just go with the tide. The society and its government have no use for the philosophy of philosophers. There is only a little bit more use for science, the philosophy of facts. War is mostly about the character.

Conflict and war are transition states. By its very nature, the transition state is abnormal, extraordinary, and exceptionally. War cannot last forever. It is necessary to achieve a new stability and a new peace because we have lost the old one. To me this simple thermodynamic metaphor of the historical situation answers the moral questions without recurring to philosophy. We have to endure the anxiety of the transition state even though it is higher than the anxiety of our initial state.

William Faulkner said in his Nobel speech:

> I believe that man will not merely endure: he will prevail. He is immortal, not because he alone among creatures has an inexhaustible voice, but because he has a soul, a spirit capable of compassion and sacrifice and endurance. The poet's, the writer's, duty is to write about these things. It is his privilege to help man endure by lifting his heart, by reminding him of the courage and honor and hope and pride and compassion and pity and sacrifice which have been the glory of his past.

I see in history the record of the glory of the past rather than the record of violence. It is, probably, an outmoded view.

When I am picking on liberalism, I do not criticize it. History of liberalism is part of "the glory of the past." I would be greatly upset by the demise of liberalism. I feel comfortably only in a liberal society. I am looking, however, for an opponent or a containment to liberalism. I see it in humanism.

Liberalism means lowering the barriers. It allows the "low energy" individuals to pass barriers (in airports, too) that would be impassable otherwise, as they are in authoritarian or rough societies. Humanism, which I understand, probably, as collateral to its many accepted meanings, is raising the barriers to harming each other and to losing human creative potential. Humanism makes distinctions and analyzes topologies. Liberalism has nothing to do with love. Humanism comes from love, and love is selective. Being human carries a liability. To love is a liability, too.

Liberalism and humanism, the brothers, seem to be on opposite sides, like in a civil war.

From afar, all wars on earth are civil wars.

END NOTES

1. Ilya Prigogine is not alone. Another deep and rich author on science of complexity is Stuart Kauffman, for example, in *At Home in the Universe: The Search for the Laws of Complexity*, London: Viking, 1995. He represents the whole school of the Santa Fe Institute , which is complementary to Prigogine's ideas and incomplete without them.

Two quotations from his book (end of Chapter 8, *High-Country Adventures*):

> Not only do organisms evolve, but, we must suppose, the structure of the landscapes that organisms explore also evolves.
>
> Evolution is surely "chance caught on the wing," but it is also the expression of underlying order.

2. José Ortega y Gasset (1883-1955) was the most lucid, consistent, and eloquent among existentialists.

> Man invents for himself a program of life, a static form of being, that gives a satisfactory answer to the difficulties posed for him by circumstance. He essays this form of life, attempts to realize this imaginary character he has resolved to be. He embarks on the essay full of illusions and prosecutes the experiment with thoroughness. This means that he comes to believe deeply that this character is his real being. But meanwhile the experience has made apparent the shortcomings and limitations of the said program of life. It does not solve all the difficulties, and it creates new ones of its own. When first seen it was full face, with the light shining upon it: hence the illusions, the enthusiasm, the delights believed in store. With the back view its inadequacy is straightway revealed.

> Man thinks out another program of life. But this second program is drawn up in the light, not only of circumstance, but also of the first (along Walter Kaufmann).

Ortega was Spanish. Existential ideas seem to be only a small part of his intellectual production. He was most of all interested in problems of society and its historical choices. Like Friedrich Nietzsche, a German, and Vilfredo Pareto, an Italian, he was elitist. The fact that the three highly original thinkers had been born shortly before Fascism came to their native countries tied them to Fascist ideology in retrospect. All three, I believe, were just sensitive gauges of their national environment and had some reasons not to cater to the common man. Ortega in his *Revolt of the Masses* did not.

3. "It is fear that I am most afraid of." Montaigne, *Essay I:18, On Fear*. Was Franklin Roosevelt inspired by Montaigne? Probably, not. It is just how it always is in dangerous times.

4. One can find a lot of definitions of humanism and its components on the Web. Strangely, none of them contains the word "love." All treat humankind as a whole. To love abstract humanity more than particular human beings and values?.. See **Essay 28**.

5. The link between philosophy and preparation to death comes from Socrates ("To philosophize is to practice dying," in *Phaedo*). In *Essay I:20, To Philosophize is to Learn How to Die*, Montaigne writes:

> To practice death is to practice freedom. A man who has learned how to die has unlearned how to be a slave.
> In truth risks and dangers do little or nothing to bring us nearer to death.

6. "When a bad time starts, it is as if on a smooth green lawn a toad appears; as if a clear river suddenly floats down a corpse. Before the appearance of the toad, the corpse, one could not imagine the lawn as anything but delightful, the river as fresh. But lawns can always admit toads, and rivers corpses," Doris Lessing, *The Four-Gated City*, 1969, Part Two, Chapter 1.

2001

Essay 30. Tinkering with Justice

[Saul Bellow, justice, equality, cruelty **]**

I begin to think that the idea of equality has become as much American as it used to be Communist. I recognize it in political correctness and the principle of "equal treatment for all, no matter what," especially, in the "no matter what." I feel uneasy with the familiar pattern and I want to understand why. Regarding the idea itself, there is no question in my mind. It is natural for human mind to explore the space of ideas in search for comfort and surprise and to invent a new one if none is found. The idea of equality, however, is one of the most ancient ones, trampled all over along and across. The phenomenon of absolute equality, as that of eternal motion—another member of the club—has never been observed on earth.

Complex ideas live in populations. Like any biological species, they are presented as packages consisting of the main idea and its derivatives. Thus, the ideas of Christianity, Islam, or Communism are ensembles of variations ranging from stiff orthodoxy to very liberal interpretation. They follow a distribution around a certain average, existing or imaginary.

The real ideology can be represented by a stack of index cards with an interpretation written on each, arranged according to the logical distance of the interpretation from the average. A few rare extreme interpretations will sit on the outside of the pack, and many slightly different will huddle in the middle. The largest distance is between the opposites. Any change, therefore, is a shift or reshuffling of the package, with the former off-center idea becoming the mainstream. The number of the cards in the pack remains the same, but the content on some of them changes. It is only rarely that a new interpretation is added on a separate card, but no card is ever *dis*-carded.

Simple ideas, for example, that life is good, do not have this kind of fluidity. Instead, the thesis and its negation are born as twins. It is only when the idea develops to a certain size that it splits into a population in which a slight change does not destroy everything and the general pattern is preserved.

For example, the idea (1) "life is very good but sometimes can be very bad" can mutate into (2) "life is very bad but sometimes can be very good" and (3) "life is good but often can be very bad". All three are pretty close, but the distance between (1) and (2) is larger

than between (1) and (3). There are methods to calculate the distance, for example, as the smallest number of single minimal changes to convert one into the other (**Hamming distance**).

The most fascinating—and terrifying—example is the shift of the ideological distribution in Germany with Nazism becoming the mainstream. There was certainly enough traditional components of national mentality preserved, but the mutations happened to be about questions of life and death. It was literally a lethal mutation. Another lethal mutation has, apparently, happened in terrorist spinoffs in Islam. I suspect they inherited the "no matter what" from Communism, itself with German ancestry. But in fact, "no matter what" has really ancient pharaonic and imperial roots. It is, actually, a meme, a gene of ideology (see **Essay 6, On the Yahoos, or Apologia of Samuel Butler**).

We all have the same ideological genotype. We all can be cruel, aggressive, and vengeful, as well as compassionate, humble, and altruistic. We all can be murderers and martyrs, although mostly in imagination. We combine codes for incompatible properties like the insects combine the codes of incompatible metamorphic stages in their genomes: egg, larva, pupa, and adult form.

The difference is that an insect can exist in only one form at a time while a human being is a superposition of all possible qualities, some in negligible proportion, others dominating, and some unpredictably popping up under the influence of emotions. The individual is as much a dynamic system, a multitude, and a society of selves as the society itself.

> **NOTE**: This seems unrelated to Marvin Minsky's concept of the society of the mind, but there is a deep underlying similarity with O.G. Selfridge's concept of pandemonium.

A probability is assigned to any possible implementation of ideas as a quantity is assigned to any ingredient of a cake. The proportion can vary within certain limits. As a curiosity, somebody could even make a cake of salt alone, but this is as rare as a human being who is plotting murder 24 hours a day.

My problem with the current stack of ideological index cards is the following.

TRIUMPH and ***shame***, PRIDE and ***defeat***, HONOR and ***disgrace*** seem to be antiquated and frayed concepts in the uninhibited and opportunistic society that thinks in purely dynamic terms of progress and setback, growth and decline, gain and loss. I feel uneasy about this mechanical image of a living system and I know why: without the old-fashioned polar categories I feel blind and helpless. They are the last limits of what I can shed in my adaptation to the new life.

At the same time, the displacement of the moral labels to the periphery of the stack is egalitarian. Nobody will ask you whether it is honorable or shameful to buy a toothbrush or to sell a car. People get equal treatment in a supermarket where moral measure has no use. Political correctness follows from the principle of equality because it ensures stability and the widest possible range of potential customers. You are not so much concerned with making friends as with not alienating anybody. When you rely on the law for your welfare, you don't want to alienate the judge. Conversely, if you don't trust the law, you want to make friends and care less about enemies.

Political correctness, therefore, has the same roots as bureaucracy: the priority of inaction over action. All acts of inaction are equally safe, while action can have unintended consequences.

I realize that all extremes, for example, militarism and pacifism, with their corresponding overtones of chauvinism and self-hate, are what they are: extremes. In time of transition, the extreme voices are always louder than the hum in the middle. But history is full of examples how margins switch places with the former core when the stack is reshuffled by winds of history.

Modern social and ideological extremes are full of stress because they are pushed to the periphery of influence, literally, *marginalized*. They do not have to compete for the focus of attention because the media notice the extremes first and run the core survey only as a scheduled maintenance. Instead of attention, the core gets the power to fence off the extremes on its own.

Why are the carriers of extreme views so militant? Because, as everything in the world, they try to minimize their stress and find peace in the middle of the humble core. They dream of ceasing the fretful status of militant minority and taking rest in the easy chair of the complacent majority.

A continuous mixing goes on in our souls and in the distribution of public opinion, as if it were a dance show with dancers who step into the limelight to do their number and step back in the shadow while a new contender takes the center stage. Unlike the scripted show, our ideas feed, grow, fight, and fall into hibernation in a not quite predictable manner.

Same happens in personal life: emotions give us strong illegitimate and mutant impulses while the day-to-day median sends us drifting down the routine. From time to time everybody jumps off the train of routine to his or her peril, albeit only in dreams.

Today, by the end of the year 2001, for example, biological research with human embryonic cells seems a marginal and extreme idea to the conservative block. Today a few people can see that the logical consequence of the illogical but seemingly pious conservative attitude is the idea that society has the right to refuse a gravely sick child, woman, and man any hope of a cure. But if the new idea is accepted and if it pushes the old and not so much ethical as religious interpretation of the sanctity of life to the

periphery, a new heresy will pick up the gauntlet: everybody can be left to die if the price of life is too high.

The change never comes from the middle: it comes from the most energetic wing of the bell curve (**Essays 14** and **16**). While all molecules are the same, the ideas are all different, as if we copied our cards on tiny tags and tied them to molecules, one to each.

The silence of the majority is the self-defeating trait of democracy. The expression "hunger for power" should be understood literally: a minority hungry for power is as active as hungry animal on the prowl for food and the satisfied majority is in after-dinner slumber.

Why do I care at all about such problems at this inactive stage of my life when the categories of ethics do not apply to me anymore because I have no opportunity to put them to test? My addiction to thinking in abstract terms makes me blow everything out of proportions: I have to fill the void of categories, which requires a lot of hot air. The true proportions can be seen only from infinite distance, but, as a decent clockwork, I am on a short tether with the current moment and show almost the right time.

I find the picture of world transformation as exciting as the birth of a volcanic island. The nascent soil comes from the four Aristotelian elements: earth, fire, water, and air. My own quasi-Aristotelian elements are past, present, future, and imagination.

What occupies my mind most is exactly the period of transition, uncertainty, and ambiguity that normally do not last. In personal decisions it is the period of weighing pro and contra, when a pair of alternatives sits on the opposite pans of the balance. My anxiety is transient, but I want to learn something permanent from it.

When people regard victory and revenge as politically incorrect, it troubles me as a photo of a mutilated body.

I am less troubled by the phenomenon of people who lost the powerful instinct of self-preservation because there are many examples of self-destructive and suicidal behavior in history. But the loss of the powerful instinct of triumph is something I cannot link to a historical precedent.

I perfectly realize that both are rare deviation from the crude but healthy average human nature preserved in the formalin jars of history. People want to live and win as much as they want to love and be loved.

I could not believe my eyes when I saw the verse from my favorite Dhammapada in a poster in the Siberian labor camp, the most unlikely place to find it if not to take to account its closeness to the Mongolian border:

> If one man conquer in battle a thousand times thousand men, and if another conquer himself, he is the greatest of conquerors. (Dhammapada, 8:103).

It never seemed to apply to suicide. It applies to triumph. I am comforted by the rarity of murder-suicide, but I am disturbed by the realization that without self-sacrifice no human greatness is possible. Greatness is also something out of fashion, except in sports.

I begin to think that my internal dissonance is centered on the concept of justice.

I try to be tolerant to the view that all people in the world equally deserve life, even in times of war. I believe, however, that the armed enemy deserves life less than a friend, whether armed or not.

My belief is far from the abstract blanket well-wishing: from my personal viewpoint, all the other people in the world are at different ethical distances from me and from each other. We can lie about it to ourselves but we act accordingly to our secret maps in the heart.

People have to choose when the choice is imposed on them, and, fortunately, making life or death decision does not happen too often. To choose for somebody or between two people, regarding the matter of gain or loss, pleasure or pain, promotion or demise, and consent or refusal—it happens every day.

Some people take a great pleasure and satisfaction in deciding the fate of other people. It would be the greatest pain for me, and I suspect, for many others.

To ease the pain of making life or death decisions in the absence of a despot, people hand over the personal responsibility to the law. In terms of geometry, by sentencing a person, they increase the distance between themselves and the offender. In terms of topology, they cancel the nearness. "You are not one of us."

There is the third source of decision: controlled chance. In extraordinary circumstances, people agree to draw lots in the matter of life and death. They control the fairness of drawing lots.

The fourth source is blind chance: something that happens on a highway, in a flight, or just in obstructed arteries. It is also the blind chance of biological evolution.

Thinking about the reasons why Darwin is still under siege in some parts of America, I find that the idea of justice, even slightly infected with chance, is the major challenge to any religion. People love lotteries and casinos, but they cannot stand the idea that they need a Green Card to go through the doors of Heaven, which they can get only by the Green Card Lottery.

Thinking about the reason why sports are so universally popular, while Darwin is not, I see that people create heaven on earth in the form of a Hall of Fame. They believe that a great baseball player owes his greatness to his own energy, talent, and skill and they admit his or her soul to the eternal paradise.

This is so strange... Life in a free society is utterly competitive. Unlike the struggle for existence in nature, it is regulated to some extent, and nevertheless it is based partly on pure luck, not just on talent and skills. In economics, the more participants, the more fair the competition. But the more participants, the more unfair it can be toward any individual participant because it does not guarantee a chance to fair hearing. Economy is the court where people are admitted to hearing by lottery because there are too many of them. Large corporations buy bags of lottery tickets, and small fish buys one or two. That can be said about the One-Percent, too.

Darwinism implies that adamant justice is nowhere to be found on earth. There is nothing more atheistic than the idea of evolution as the game of chance and necessity. Even Albert Einstein felt some discomfort at quantum injustice in the form of randomness.

> What is very plain, however, is that the ideas having the highest invading potential are those that explain man by assigning him his place in an immanent destiny, in whose bosom his anxiety dissolves. (Jaques Monod, from: Chance and Necessity)

How lively and realistic was the Greco-Roman Pantheon with gods as fallible and irrational as people, and as receptive to bribe and temptation! No wonder the luscious Western thought grew from it. The pagan gods of antiquity, worshipped no more, are taking revenge on monotheism with the weapon of science and secular philosophy.

Thinking about the reasons why American democracy and its history stand alone in the rest of the Western world, I attribute it (no pretense of originality) to the phenomenon of the open frontier which for a couple of centuries provided the nowhere else to be found abundance of free land. As result, the probabilistic injustice was for a while suspended for the White American. Competition was not so much for life itself as for money. The picture looked different through the eyes of Indians and Black slaves.

But when I try to see the world through the eyes of a mass murderer, there is nothing but red haze in my eyes. I believe that my mind needs to be severely twisted for such ability. And yet we all, each of us, have the same human nature as common for us as the bee's nature is for various social types of bees: queen, worker, and drone. Our genome produces them (us) all, and when the queen dies, a new one takes the available place. We do not worship the King, but we may worship the King of the Hoop or the Queen of Pop. There is a card with "hail the King" in everyone's personal stack.

The mass murderer, the terrorist, the dictator impose their own justice and their own ratio of chance and necessity. Confronting this kind of justice, we have to either accept, or fight, or cheat it by our own justice.

To speak against equality is politically incorrect. But would that be politically incorrect in our times that women and children leave the sinking ship first and the captain leaves last? I am against equality as an imperative. The absolute universal comprehensive equality means the world without love because love is inequality. Equality is nothing but

the political eternal motion: equality of civil rights, opportunities, responsibilities, and numbers. It is never completely achievable and the capitalist economics is based on inequality. Communism collapsed because people began to accumulate wealth while the ideology limited the inequality.

Finally, I see why I cannot find peace of mind: I have no intellectual friends. I feel myself as a member of a quiet minority, which may be even more stressful than being in a militant minority. I am looking for allies. If you have even a single ally, you are not at the very tip of the distribution wing.

I discovered Saul Bellow while in Russia. Even after his Nobel Prize of 1976, Saul Bellow was not permitted to be translated. A friend of mine who lived in Moscow and had contacts with foreigners, supplied me with books in English, Saul Bellow among them. I read all his books up to *Humboldt's Gift*. It was a difficult reading at my level of English, and it still is, at a much higher level. Bellow, like Montaigne, is an intellectual writer, introspective and rambling, with his incessant monologues and treading intellectual water. The action goes nowhere but the thoughts are boiling, sometimes down to shreds, as overcooked fish. I was completely happy with the thick mental chowder that would repel most readers. Action can be found elsewhere, but the thoughts could not.

The Dean's December, the first book written by Saul Bellow after his Nobel Prize, had the familiar tense and badly lit air. After my life in Russia and my one year stay in Chicago I still could equally identify myself with both the American setting and that of Communist Romania.

The title character of the book, a Dean of a Chicago College, publishes papers about the problems of inner city. This leads to his conflict with the Provost. I quote from the paperback edition: Saul Bellow, *The Dean's December*, New York: Pocket Books, 1982.

> Capitalistic democracies could never be at home with the catastrophe outlook. We are used to peace and plenty, we are for everything nice and against cruelty, wickedness, craftiness, and monstrousness. Worshipers of progress, its dependents, we are unwilling to reckon with villainy and misanthropy, we reject the horrible—the same as saying we are anti-philosophical. (p.220)

Why? Because catastrophe is an ultimate inequality: I die and you don't? To reject the horrible means to reject violent response to it.

I am uncertain whether long quotations are allowed (a mind-boggling paradox: free speech and intellectual property) and I add only three more.

> A tender liberal society has to find soft ways to institutionalize harshness and smooth it over compatibly with progress, buoyancy. So that with us when people are merciless, when they kill, we explain that it's because they're disadvantaged, or have lead poisoning, or come from a backward section of the country, or need psychological treatment. (p.305)
>
> Suppose the public expense of kidney dialysis is ninety thousand dollars a year in a clinic that keeps six or seven dim, unproductive lives going—will we let these old folks watch the television for another year yet?" (p.305-306)
>
> They're just a lumpen population. We do not know how to approach this population. We haven't even conceived that reaching it may be a problem. So there's nothing but death before it. Maybe we've already made our decision. Those that can be advanced into the middle class, let them be advanced. The rest? Well, we do our best by them. We don't have to do any more. They kill some of us. Mostly they kill themselves. (p.229)

The author should never be identified with his character, even in memoirs. What the Dean says, in my re-interpretation, is that every society sets an acceptable, i.e., institutionalized "level of pain," in Bellow's term.

Mass executions and death of hunger were openly acceptable in Lenin's revolutionary Russia. Stalin was already hiding them. The mutilations were an acceptable level of pain in Sierra Leone. Rape of a child as cure of AIDS is said to be culturally institutionalized in South Africa.

However liberal, American society still approves of the pain at the level of capital punishment, which the European Union does not, but Europe has nothing comparable with the American underclass.

Any society accepts some level of pain, suffering, injustice, and accidental death. The American society is constantly bleeding from automobile and airplane accidents, gang shooting, drug overdose, and child abuse, which is as socially tolerable as a certain rate of fire, flood, and tornado damage. We may expect hiking the pain level to the additional bleeding from terrorism, internal and external. This seems to me the most probable outcome. Another compatible move is raising the barriers of inequality.

Bellow's book is an unintended illustration to the concept of historical progress. A lot of things have happened since 1982: the World Communism has been dismantled and the National Communism of China substantially decreased its level of pain. Whether life of Chicago housing projects or Miami gangs changed, I have no idea. It is not in daily news. Generalizations on this issue are not a popular news topic.

My position regarding the level of pain is that: (1) it is part of life, (2) it historically subsides in some forms, and (3) it historically appears in new forms. It is being reshuffled, like all ideas. In other words, cruelty is a form of life, and it evolves through new species and decline of old ones. This is a fatalistic view, but if we acknowledge competition, it is as natural as to deny eternal motion. The idea of equality, even in the

form of equal opportunities, and the idea of competition are logically incompatible. This is one of the hidden fissures of the American mind. At least it (the mind) is not closed.

2001

P.S. (2016). Thinking about the nasty, loaded, and dangerous political situation in this , Election Year, I find that, after decades of Red-Blue tug-of-war, Cold Civil War, and War on Terror, the natural hunger of masses for victory already cannot be satisfied with sports. It needs a grand bloody victory over the hated enemy, followed by triumph, procession, four-horse-chariots, feast, and gladiator fights in Coliseum. What depresses me most is that people want it NO MATTER WHAT. Otherwise, I would be with masses. Probably.

Essay 31. On Poverty

[foreign aid, Gini coefficient, world poverty, Pareto distribution, philanthropy, Lorenz curve, United Nations, World Bank, order, Pareto law, probability, George Soros, A. Dragulescu, V. M. Yakovenko]

I see absolute poverty as persistent prolonged suffering that could be alleviated by money if only it were in the pocket. Absolute poverty is, probably, more the lack of hope than the lack of money.

I never knew real poverty. My personal sufferings could not be cured by money. They were caused by conflicts, some of them internal, some with the environment. Looking back at some later periods of my adult life, I see that I certainly lived in poverty by American standards, but not on the average Russian scale. As a consequence of my idealistic and bookish upbringing, I never had lust for money in Russia; besides, being rich was something shameful in the Soviet time, and not just because of Communist propaganda. All my book heroes, mostly explorers and scientists, were selfless and idealistic. Only the crooks and thieves could be rich because being rich was against the correct Soviet order of things. The ruling class did not need much money: it bartered goods for power. There was a closed network of distribution of goods for the *nomenclatura* (the privileged class).

I could do with little, I could be occasionally wasteful, but it never occurred to me that making money could be my personal life goal. Nevertheless, I was always afraid of poverty as if it were a painful a debilitating disease, which, I still suspect, it is. To be poor in the absolute sense seems like a terrible fate. Money feels to be the only working remedy against a buildup of spiritual entropy and personal decay caused by poverty, but this is a shallow statement: a tautology. There are many other ways to decay. Yet the power of money reaches farther than any of them.

From the position of active humanism (which is the work toward decreasing human suffering, see **Essay 29. On Goil and Evod**), as much as poverty is real and painful, it should be fought against. This poverty is really a disease, even if the poor people do not see it this way because everybody around is poor. To raise people from poverty is like to cure the sick. This is why, in my personal opinion, treating poverty does not need any philosophical justification.

This point of view can backfire, however. It seems that poverty has always been regarded as natural as accidental death, sudden illness, and aging. Judeo-Christian ethics requires

compassion to the poor. In Christianity, Judaism and Islam it is explicitly required to be active.

> "For you always have the poor with you, and whenever you will, you can do good to them; but you will not always have me." (Mark, 14:7)

While the poor could still sing and dance, poverty was an acceptable form of social life. At the opposite end of the scale has been the idea that the poor deserved their poverty, with which I find difficult to argue because the term *deserve*, as well as justice in general, have nothing to do with principles of nature or logic.

> There is an eight-level gradation of acts of charity in Judaism. The highest form is to put the poor on his own feet and make him self-sufficient. The next level down is when neither the giver nor the receiver know each other, and the lowest is to give unwillingly. In Islam, charity (*zakat*) varies from voluntary to a kind of a government tax. In Christianity, charity is simply among highest virtues. It brings the man closer to God. It seems that in America, with its variety of denominations and degrees of religious zeal, it can be a politicized matter of choice.

Humanism is an idea, and as any idea, if given a primacy over basic human needs, it can lose its moral authority. Yet to feel good is a basic human instinct, and some can feel good by watching people who have not a single reason to feel good. I do not see a contradiction, however, between the millennia long glorification of violent victory over the enemy and a very diverse stock of ideas spanning from the religious duty of compassion to modern liberal ideas and humanism. The instincts of victory and superiority are basic, but they are still instincts and not vital needs.

But is poverty natural? This touchy question is open to investigation because we have observable measures of wealth. Moreover, wealth itself is the only human quality quantifiable with high accuracy. As I believe, this is why it has been so popular as the ultimate personal goal in modern number-crunching society where nobody can dispute wealth but glory for one is shame for another. For a sceptic, what can you prove in this world but that number 5 is more than 4?

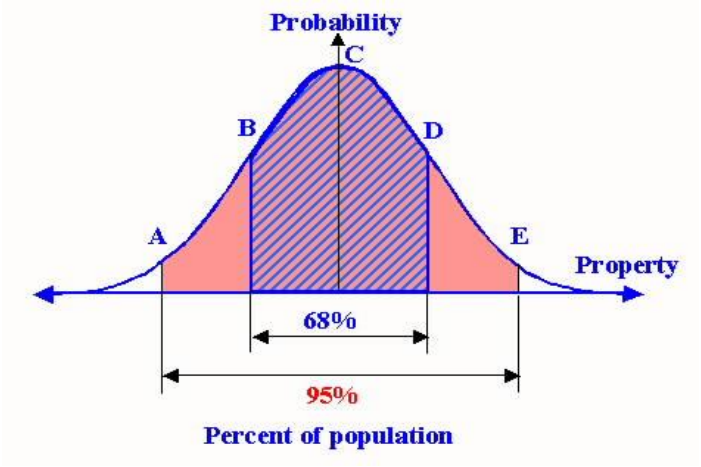


Figure 31.1

As for any quantifiable property, the bell curves of income and wealth distribution should have two wings: a small number of people would be very poor, a small number would be on the other side, and the majority would crowd around the average (see **Essay 16, On Somebody Else**). I reproduce it in **Figure 31.1**.

This is what happens with height, physical strength, intelligence, health, and other human qualities. Same, probably, applies to the ability of people to work, earn money, and stay away from poverty. But this is not so with income and wealth.

I got interested in the problem of reducing world poverty, especially, in the United Nations program. I became very skeptical after I had found some arguments for the natural origin of poverty. I also found myself in a good company of sceptics. But I also found something to the contrary.

Suppose, 20% of the world population possess 80% of world wealth, which is more or less close to the actual state of things. The ratio 20-80 is known as Pareto's law and was formulated in 1896 by Vilfredo Pareto. It follows from his simple equation (see APPENDIX **A**) for distribution of wealth or income in society. In its simplest and strictly qualitative form, it was described in the New Testament:

> For to every one who has will more be given, and he will have abundance; but from him who has not, even what he has will be taken away (Matthew, 25: 29).

Pareto's law fascinated me since my youth, when I had first learned about it. Pareto's law describes a very general and yet mysterious principle of human society. There are various manifestations of this principle, not at all related to money. Thus, according to Zipf's law, a very small number of words constitute a very large proportion of texts (In English, *the*, *of*, and *to* are the winners). There are other formulations and applications of this general principle of uneven (logarithmic) distribution, so different from the normal bell curve distribution of physical properties in nature where most property carriers are in the middle range. In a society, most owners are in the lower range and a few can own more than all the rest combined.

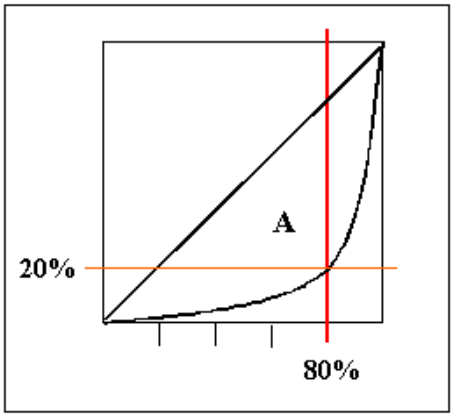


Figure 31.2

Gini coefficient is a widely used measure of income inequality.

The square chart is a cumulative distribution known as Lorenz curve. The horizontal axis is percentage of population and the vertical axis is the percentage of total wealth/income it possesses. If it was distributed equally between all members of society, then 10 % of people would have 10% of property, 80% would have 80%, etc., and the distribution would look exactly as the diagonal. The actual unequal distribution, for example, along Pareto's

law, would look like the curve that allocates 20% of the resource to 80% of owners, and, therefore, 80% of the resource to 20% of owners .

The Gini coefficient is the ratio (fraction or percentage) of the area **A** between the curve and diagonal to the area below the diagonal, i.e., half the square. It is a measure of deviation from the perfectly egalitarian diagonal distribution with 80% of people having 80% of wealth and 20% having 20% of it.

While Pareto's curve is calculated along an equation with an only approximately defined constant (see **APPENDIX A**), the Lorentz curve is empirical. It is difficult to compare them. Nevertheless, the 20-80 rule corresponds to Gini coefficient between 65 and 75. All such measures, however, terribly simplify reality. There is also a big difference between income and wealth. With big wealth (cattle, bank account) one may have no need of any income. On the other hand, inflation and debt may annihilate big wealth and income.

Therefore, highly hypothetically speaking,

in order to double the income of 80% population, the benefactor should find a source of income equal to five times the amount of the current wealth: one part for the poor and four parts for the rich.

We cannot be rich without super-rich, can we? If not, the rich would gradually take away most of the surplus given to the poor, not necessarily because of their ill will but because of the Pareto's pressure.

This, of course, is a gross simplification. The condition of people can be improved through infrastructure, institutions, education, temporary subsidies, vaccination, and one-time investments that could not be appropriated by a small fraction of the population. Education, for example, is something that cannot be taken away (it can by discrimination, however). This is what the UN anti-poverty projects intend. They are institutionalized as banks (World Bank and IMF) and I find it hard to believe that any bank can be an institution of philanthropy. But this is all politics (i.e., the realm of who *deserves* what) while I am interested in the nature of things.

All I can say is that to just loan money to poor countries to fight poverty as their governments consider appropriate seems both immoral and irrational.

Source of information on world debt. http://www.worlddebt.com/

This Essay may be an ignorant speculation, but it is based on some available knowledge. My conclusion is that in order to give more to the poor without giving more to the rich,

one has to spend significant additional money for keeping the society from following the Pareto's curve. In other words, the benefactor has to enslave (*control* is a milder term) the beneficiaries. The one who pays orders the music.

This experiment has been conducted on a totalitarian scale in Communist countries. The Russian Gini jumped from 25 to 40-45 after the dismantling of Communism. It plunged in Cuba after the advent of Castro because the rich left the island.

Gini of Cuba	
	57.13
1962	28.11
1973	28
1978	27

One can find if not a wealth of money than wealth of data in the truly amazing database of World Institute for Development Economic Research (WIDER) that evaluates world income inequality in terms of Gini coefficient, country by country. The data were collected in different ways and from different segments of population, and they are often contradictory.

The WIDER database (1.6 MB in Excel format) contains 5068 entries. The maximal Gini coefficient per household is 79.5 for Zambia in 1970 and the minimal Gini was 12.1 for urban China in 1982. It may seem that Zambia was the epitome of capitalist exploitation and China a paramount of egalitarian democracy.

Many Communist countries had Gini below 20 at various times: Hungary in 1996 and 1997, China for many years, Slovak Republic around 1990, Romania in 1989. Many had Gini slightly over 20 before the collapse of Communism. The pool of egalitarian societies included also Sweden in 1980-1983 and rural Pakistan in 1970, although no two countries seemed to be farther apart in all aspects. Overall, Pakistan had Gini around 35, as if it were a West European country. Finland in 1988-1991 had Gini in the lower 20's, but, with a different methodology, between 40 and 50 in 1992-96.

Most developed countries were in the lower 30's: France, Canada, Italy, Japan, Norway, Spain. So was Germany, but according to one source, its Gini was between 18 an 20 in 1990-91.

Greece had Gini of 40, and USA, with its Gini of 35-45, was in the same fortyish category as Greece.

Most inequality could be found in poor countries, and this is where metodologies agree:

Gini over 50: Mexico and Philippines in 1960's, Malaysia in 1973, Kenya in the 90's, Costa Rica in 1989-95. Gabon in 1960, Sierra Leone in 1968, and Brazil in 1995 had Gini around 60. Gini of 70 (for one exception) was not observed and Gini over 60 is extremely rare.

I am forced to come to the conclusion that:

If Pareto's law is in the nature of things, then there seems to be a disturbing problem in the UN projects of decreasing poverty.

In order to decrease inequality, the existing social order has to be changed.

And that was exactly the idea of Marx and the entire tree of thought that grew from it, from Communism to the West European Socialism. From what I know about Karl Marx, he and his family knew poverty too well. It is only the power of government, not necessarily, oppressive, that alleviates the Pareto pressure.

In an attempt to improve the fate of the poor, without taking anything from anybody and without changing the social order, most of the expenses will go to the rich and the rest to the poor, not to mention the money to maintain the staff for all that.

The first ("rich") component of the expenses can be decreased if the social order is changed, but the change would cost, probably, the same money as should be otherwise given to the rich.

NOTE (2016) What can happen if inequality is unstoppable? See the highly relevant **this** , with the striking chart of Income Rebellion Index up to 2000, which clearly predicts the Primaries 2016. History of inequality is history of social earthquakes, which may not even need organization.

The choice between poverty and better conditions coming from a benefactor involves the choice between freedom and dependence. Only the free society, however, can have this choice.

The best anti-poverty investment, therefore, seems to be the investment in democratic socialism. With democracy, however, we are getting into a giant swamp of politics, which is today the art of buying and selling democracy, see newspapers and TV. Democracy is an expensive and fragile luxury. In a poor globalized world, democracy will be under destabilizing pressure of regions with more poverty. I believe, this is one of probable causes of the anti-Western reaction in the world, represented by China, Russia, and militant Islam.

As we saw from examples of Sweden and rural Pakistan, the equality of income does not necessarily prevent poverty.

I think that it is not “normal” natural inequality and not even poverty by Western standards that should be fought, but suffering, regardless of its origin.

Concentrated wealth is the power of nations. Throughout history, the way I see it, constructive efforts have always been driven by concentrated wealth, not by the divided one. The government can govern because it taxes the masses. It is because of the concentration of wealth in the hands of the rich, including rich government, that society can make general progress, develop new institutions, services, and art, and become more liberal. It is crucial for the technological progress even if we frown upon it.

Vilfredo Pareto was an arch-enemy of Marxism. No wonder: his law has been the strongest argument against expropriation of expropriators. Concentration of property is as natural as relative poverty. There is nothing natural, however, in absolute poverty in modern society. To accept absolute poverty is as shameful as accept public execution and torture (see **Essay 32: On the Split**).

Wealth is not immoral but poverty is.
Loss of freedom is a side effect of loss of poverty.

NOTE (2016). This Essay is outdated. I return to the problem of inequality in **Essay 57, The Few and the Many.**

APPENDIX

A. From : http://cepa.newschool.edu/het/profiles/pareto.htm

In the *Course*, his [Pareto's] main economic contributions was his exposition of "Pareto's Law" of income distribution. He argued that in all countries and times, the distribution of income and wealth follows a regular logarithmic pattern that can be captured by the formula:

$$\log N = \log A + m \log x$$

B. I could not find an established explanation of Pareto's principle. Any explanation should at least consider two distant examples: language and society.

I explain it for myself in the following non-professional manner.

1. Biological life is competition for limited resource. Human society creates surplus resource that can be stashed away from immediate consumption and used for production and maintaining social order. The material surplus can be as much a carrier of social work as electricity a carrier of mechanical one. An animal uses brute force for dominating other animals. A human uses food, Things, other humans, and money as an equivalent of all of the above, for the same purpose. This seems to be a Marxist view of society: the driving force of social mechanics is surplus that cannot be eaten on the spot.

Society is never in equilibrium: this is why history happens.

2. Pareto's distribution can be perceived as a grossly deformed normal distribution. If normal distribution exemplifies chaos, Pareto's distribution points to a strong order. The deformation is possible because concentration of money in one hand provides enough energy to take money—one by one—from those who have little and cannot resist. This

"one by one" is very important: energy can be invested, returned, and reinvested, which is in a sharp contrast with its deterioration and dissipation in the physical world. It happens until an equilibrium establishes. In other words, the rich can hire and army and the poor cannot. Moreover, the rich can hire a government or simply be it.

3. The resistance of the majority to the inequality is decreased because they have a kind of reward from the rich who offer protection, stability, and other benefits, real or fictional. In other words, the inequality is a social contract: you can grow bloody rich, but give me a job.

4. In the end, Pareto distribution is the result of clustering: like modifiers cluster around meaningful words, which results in the Zipf's distribution, members of society are not independent and cluster around the leaders and employers of all kinds. There is a small number of large cities because people gravitate to large cities. There is a small number of large fortunes because money sticks to money and people to stability. There is a small number of large companies because small companies are eager to sell themselves to large companies. The Pareto pressure is a result of hierarchy of domination. Or, to put it differently, it is the result of dependence, so different from the physical world with the statistics based on independent events. The total of wealth and income is more or less constant over short periods of time and individual values depend on each other: a case of competition for a limited resource. On the contrary, IQ and height of a man do not depend on IQ and height of any other unrelated man.

5. If we consider just the general shape, not exactly the plot of a mathematical function, we can see that Pareto distribution looks like a cutout from a wing of normal distribution, which means that there is anything but a random process behind the former.

In **Figure 31.3** I compare them as four graphs. **Probability density** shows the chances (vertical axis) that a random sample will have the property value on the horizontal axis. Property can be, for example, height, wealth, income, number of publications, total number of sexual partners (a few Casanovas and Don Giovannis have most victories), etc. Samples are humans selected at random. **Probability distribution** shows the chances (vertical axis) that a random sample will have the value between zero and the value on the horizontal axis.

> **NOTE**: Probability density is a derivative of probability distribution. Curves 1-4 reproduce only the general shape. They are not the plots of the actual functions. See on the Web the plots of both density and distribution functions for normal and Pareto distributions.

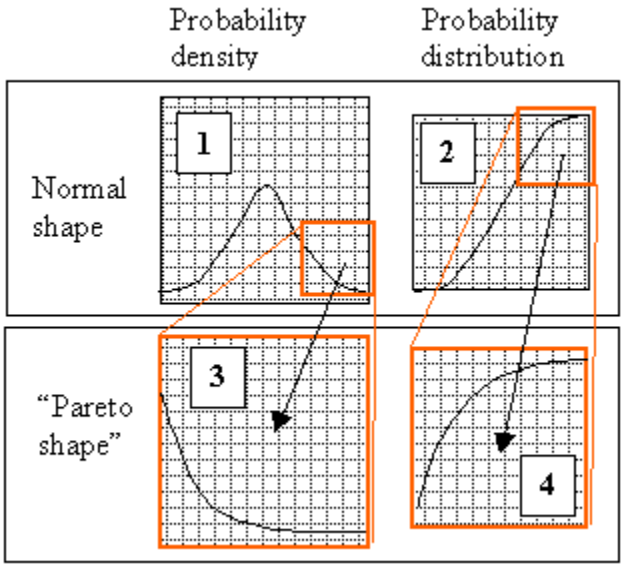


Figure 31.3

This is what the plots tell us when we move along the curve from left to right.

Curve 1. Very few samples have the property very much below the average, most have the property close to average.

Curve 2. The number of samples with a very low property is very low, the same true about high values; the

middle, however, is very egalitarian, it is almost straight, like the egalitarian diagonal in Figure 2. Note, that the high end cutout from Curve 1 starts from the lowest values in Curve 2.

Curve 3. The number of samples with low values of property is very large, but all the large values belong to very few samples.

Curve 4. The number of samples quickly grows when the value is low, but only a small fraction of samples falls into the region of high values. This curve looks different form the cumulative curve in Figure 31.2 (it is Figure 31.2 flipped over the diagonal) , but has the same meaning. Curve 4 reads: the probability that somebody selected at random will be in the lower value range grows fast, but slows down in the high range.
Note, that the high end "cutout" form Curve 3 starts from the lowest values in Curve 4.

There were a lot of debates around Pareto distribution. Its shape does not look completely realistic because it suggests an exaggerated ultimate poverty in its left wing. It is realistic, however, over most of its range. See APPENDIX **G.**

C. From: http://cepa.newschool.edu/het/essays/paretian/paretoptimal.htm
(there is an interesting discussion)

A situation is not Pareto-optimal, then, if you can make someone better off without making anyone else worse off.

My view is that the world philanthropists, probably, want distribution to be ethical, and, therefore, not Pareto-optimal. This is possible, however, only if a certain order of **material distribution (i.e., of wealth and income)** is imposed on a country. An example of an efficient, **internal,** and Pareto-optimal imposition of this kind is land reform.

D. from : http://www.worldwatch.org/pubs/paper/155facts_myths.html

Myth: The World Bank and the IMF exercise absolute power over the economic policies of developing countries.

Fact: In general, governments of poor countries, like governments of rich countries, only adopt policies to which they are committed as a result of domestic politics and circumstances. The World Bank and the IMF have required dozens of poor-country governments to make "structural adjustments" such as privatizing state companies and cutting spending, in return for loans. Yet borrowers have for the most part only implemented measures they would have taken anyway, such as cutting spending in order to repay debt. A new World Bank survey of ten African nations found that only two, Ghana and Uganda, had made and stuck to the reforms demanded of them. (pp. 38–39)

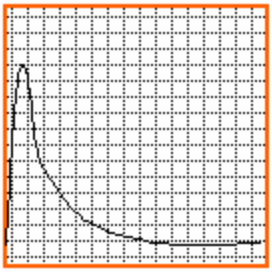
Therefore, the creditors want social changes but do not have armies and budget to enforce them.

E.

> "Most of the poverty and misery in the world today is due to bad government—repressive or corrupt or simply incompetent regimes and failed states." (George Soros).

This is something one does not need any mathematics to notice. What Soros actually criticized was the use of foreign aid by the US Government for geopolitical reasons. The UN World Bank argues that poverty should be fought across the national borders in order to prevent the hostility and revolt of the poor against the rich—a typical geopolitical reason.
Much more on *Business Week* site.

F. After this page had been published, I found a reference to the book by William Easterly: *The Elusive Quest for Growth: Economist's Adventures and Misadventures in the Tropics*. The MIT Press, 2001. Judging by the review in *The New Yorker*, March 18, 2001, it confirms my conclusions, which are, most probably, not new.



Actual distribution of income in USA

Figure 31.4

G. An extremely interesting econophysical analysis of money as analog of energy gives a non-Pareto (Boltzmann-Gibbs) distribution of probability of owned money with the same general shape, plus other interesting for a specialist ideas. Exchange of money is regarded as similar to exchange of energy in molecular collisions. The closest analogy is a society of gamblers.

This model does not take to account the ability of money to grow on the flow of energy and dissipate, as it would be in life-like non-equilibrium models, but the results are very realistic. The authors acknowledge the limitations of equilibrium models but justly regard them as valid approximation.

In fact, the actual distribution of income (A. Dragulescu, V.M. Yakovenko. Evidence for the exponential distribution of income in the USA. The European Physical Journal B, 20, 585-589 (2001); can be found at: Yakovenko) is just the normal shape very much skewed to the left (**Figure 31.4**).

This seems to confirm my thesis that social order is measured by the distortion of the normal distribution. Egalitarian and Pareto distributions are two extreme examples. It would be interesting to find data on the food consumption of feeding animals in a groop. It might be represented by the weight distribution of grazing animals, for example. I bet it is normal: animals do not have either capitalism or communism. The quantitative economics of tribal societies is also interesting.

2002

Essay 32. The Split

[public execution. cruelty. social evolution. social norm]

At this point I am looking with disbelief at my own Essays. What is happening to them? They are affected by current events and refer to current press, they crawl into appendices and technicalities (where I should never venture), and they are getting politicized, quite contrary to my intent.

Of course, one reason for that was the terrorist attack of September 11, 2001 that woke me up in the middle of my reveries. Another reason, which I am only starting to realize, is that the world has been changing much more radically than I thought earlier.

The Essays I planned were about more or less stable principles of human life. The laws of inanimate nature interested me only as far as they could be extrapolated or interpreted on the material of history, social change, and personal life. That was the very idea of the Essays: to show how simple scientific concepts can be humanized and given a say in everyday life, on par with what we want, feel, and believe. Today, however, I see how the clearly defined fundamental notions of human reality such as democracy, autocracy, poverty, wealth, capitalism, and socialism have become opaque, blurred, contradicting, and charged with the internal pressure splitting them into smaller but independent components.

Something remains the same for long period of times, but it is growing more and more abstract and less relevant to the problems of the moment. There is an intense evolution going on within large and stable categories that define human nature and daily existence.

This Essay is about split. It was initially just an introduction within a larger one. The main subject of the original Essay was evolution of power and how the authoritarian power is splitting off its new evolutionary form. The subject of the introductory part was just the mechanism of evolutionary split. I intended them as one, but they split because an Essay must have the unity of subject. Both subjects—that of the introduction and that of the core—grew equal weight. This is how the current Essay became independent. It is about itself, in a sense. The other part becomes the following **Essay 33, The Corg**.

According to Perky T. Ryan, the last public hanging in America, witnessed by about 20,000 people, happened on August 14, 1936.

Public executions, with or without various degrees of torture, were part of everyday life in Antiquity and Middle Ages. Jesus Christ, Thomas More, and Rabbi Akiba come to mind, with endless list of other martyrs.

For the most of human history execution was public by definition. It still is in some Islamic countries, Saudi Arabia, for example. Capital punishment does not exist in the European Union. America wrestles with itself about it. I accept it.

Today a much larger audience can see death on all kinds of screens and displays in quantities partially compensating for incomplete authenticity. People want to see suffering, pain, and death of other people and what people want they will get anyway. Modern entertainment is what Roman Coliseum was 2000 years ago. The Coliseum was as much an evolutionary predecessor of cinema, video recording, and professional wrestling as ancient shaggy bipeds with stone tools were our own ancestors.

The transformation of the Coliseum into a video store and the gladiatorial fight into a movie *Gladiator* are episodes of the evolution of culture.

We all deviate from the abstract average, along all dimensions of our nature. Most of us feel strong revulsion to violence, while others are driven to it. The actual ratio of displayed cruelty to compassion in most individuals can be modified by cultural influences. In turn, the culture and social norms can be strongly influenced—in whatever direction—by efforts of individuals and, especially, organizations.

Culture evolves. Evolution is as much about transience as about permanence. By drawing an evolutionary line from the ancient Coliseum to a modern video store I emphasize not the obvious change but the hidden continuity.

There are two aspects in the concept of evolution. Variability is obvious: everything changes. The other aspect is the constancy of widely defined types. Thus, the tetrapods have preserved their general design over a very large time span, throughout emergence and extinction of incalculable particular species. They are, in turn, only a subdivision of a much larger class of vertebrates.

The dynamic aspect of evolution is conspicuous. Our cultural habits change. Some of us strongly identify ourselves with the tortured person or animal because we are usually protected from suffering in everyday life. In a more sinister Freudian key, we are, probably, subconsciously afraid that our children and even neighbors will do such things to us. In a more abstract philosophical key, we regard ourselves the center of the Universe. In an ethical key, all basic religions forbid to do to others what we don't want to be done to ourselves. In a systemic key, when we are not competing for food and water, we become kinder and gentler to each other and the whole world.

The problem with religions—or ideologies that override religions—has been that they may not consider all humans "ourselves," see **Essay 24, On Myself** , as we do not consider apes human.

All traditional religions are much older than the map of the world and the modern realization of a great variety of us and others in close contacts, conflicts, and competition. Not all *others* are *our others*. They are, at best, our others but one grade lower or they are, at best, born equal. The opposing ideology is the liberal view of the world as a family of twins, even without the difference between men and women, in an extreme version.

It is a remarkable evolutionary step to offer a special protection to apes not because they are just animals but because they share traits of humanity with us. When we compare this branch of moral evolution with the much older one, which does not consider civilians of another way of life as fully human, it seems that the humankind is really repeating in moral sphere the divergence that happened many millions of years ago between humans and apes. Now the elephants and whales, forests and glaciers, water and air—all that is *our others*, branches of the same tree.

Modern humanism, which I understand as a course of actions intended to decrease human suffering (**Essay 29, On Goil and Evod**), is a product of evolution. Its further evolution in developed countries has brought us not only universal human rights, but also animal rights and conservationism. Its ongoing evolution imposes, weakly, limits on the realism of cruel violence in movies and TV. But this evolutionary view of humanism only emphasizes to me the permanence of its antipode embodied in mass terror of all kinds, including the large-scale state terror of the Nazis, Gulag, Khmer Rouge, and in Sierra Leon. It is part of human nature.

The static aspect of evolution is paid less attention than the dynamic one. I feel a need to portray it in a specific way, not as the commonly used evolutionary tree, but as a kind of pre-existing condition. Remember, man or elephant, we are all tetrapods, former or current. Once born, tetrapods brought their tetrapodiness into the world. Unlike their feet and toes, tetrapodiness, i.e., possession of four limbs, is an invisible abstraction, an imaginary box that should be filled with figurines. While we are tetrapods, we are also bipeds, we wear shoes, and they change with time, from sandals of the antiquity to high tech snickers. It is the shoebox labeled "footwear" that stays constant.

Any modern phenomenon, institution, or idea has its genealogy. We can trace them back, year by year and millennia by millennia: entertainment, technology, transportation, communication, state, warfare, trade, money, home, beliefs, marital and kinship relations. We can keep track of this travel backwards in time only if we define our topics in a very abstract way. Any particular feature will soon disappear from our past, as with radio and vaccination of children, but messenger and medicine man have lasted for thousands of years. In the end, we will come to bare human nature: a pack of biped tetrapods with tools, language, and ideas.

In the following **Figure 32.1**, the chest of drawers **A** symbolizes a certain primitive culture with four abstract domains. For the sake of illustration, they can be healthcare, entertainment, technology, and communication (and footwear, as

well). The red ball represents the single choice of the medicine man in the drawer of healthcare. Culture **B** is more developed and complex. There are more compartments, for example, a witch doctor (red ball) and a medical doctor (green ball) in the former single healthcare drawer. They both share the area previously taken by the medicine man. They are compartments inside a larger drawer. Evolution multiplies the smaller compartments but preserves the larger ones.

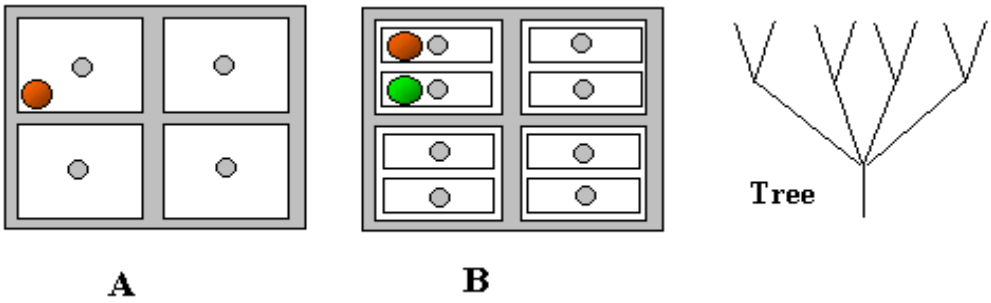


Figure 32.1. The evolution chest

An evolutionary tree is shown for comparison. Representations **A** and **B** are, actually, maps. . They can be compared with mapping a continent into nations, regions, and districts, or, in the case of the USA, maps of the states, counties, townships, lots, and rooms of the homes with the drawers of furniture and the storage boxes. The maps are tied to space, or, to be precise, to land that cannot be either created or annihilated. They are drawn at different times.

Abstract sets are collections of elements devoid of location, distance, area, and even quantity. Some sets overlap because they contain the same elements. Others have nothing in common. One set can completely include another. Sets are mental objects that are designed to be kept in mind. An element of a set can be anything, and a set can include none, one, several, many, or infinity of elements.

We, humans, feel an urge to share our minds with others as well as the curiosity to see what is on somebody else's mind. We need some tangible and eloquent medium to share our thoughts. Language, of course, works, but it could be confusing and cumbersome. Just compare verbal road directions and a concise drawing.

The most common way to visualize the relationship between sets is Venn diagram (**Figure 32.2A**) . It is a very simple thing: each set is portrayed by a closed curve, usually, circle. Some of them may overlap, as in **Figure 32.2A**, where **N** may mean men, **K** happy, and **M** young. Then **L** means happy young men. There is plenty of space in **N** for all varieties of men, including old, unhappy, and serial killers.

If **K** is men and **M** women, then the circles cannot overlap by definition, although in fact there is a tiny physiological or psychological overlapping , rare for humans but completely natural for other species such as some plants and earthworms. Apparently,

capitalism and socialism can somewhat overlap but democracy and dictatorship cannot. Or can they? Even Napoleon legalized many essential democratic freedoms within his imperial rule. In the process of biological evolution there are transition forms that combine properties of different types. They were first suggested by Darwin, but today the question how biological evolution works is not quite closed.

Back to sets. The things in our mind, with all their immateriality, are not extinct species and we can observe their evolution. Thus, as a Venn diagram, **Figure 32.1B** would look similar to **Figure 32.2B**, where the sets do not even partially overlap. The important difference, however, is that the chests of drawers **do not have space for new initial drawers**. This is why I prefer its symbolism to both map and Venn diagram. On the contrary, the largest external set **N** in **Figure 2A** has more room for other enclosures.

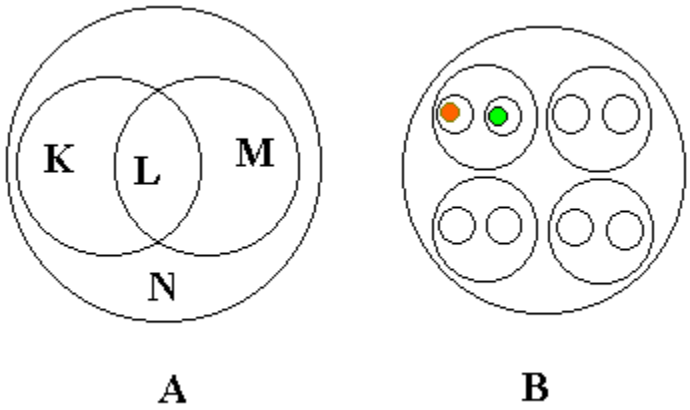


Figure 32.2. A: Venn diagram; B: Figure 32.1B as Venn diagram

Here is my thesis:

what we call human nature starts as an initial set of drawers (domains) that has no room for expansion, but can be further subdivided .

This looks like a very extreme and heretic statement which is tantamount of saying, together with Ecclesiastes, that there is nothing new under the sun, in a sense.

> The thing that hath been, it is that which shall be; and that which is done is that which shall be done: and there is no new thing under the sun.
> *Ecclesiastes*, 1: 9.

My remaining goal is to show in what sense. Really, where to put the computer on the map of evolution? It looks like it sprang out of nowhere. The same can be said about all technology from steam engine to jet airplane. What about human nature? Of course, it had its evolutionary predecessors in animal nature. But as soon as something appears, it carries all its suitcases into the future until something else appears instead.

In fact, the hidden agenda behind my statement is simple. I believe that human nature includes tools as its primary drawer. As the humans appeared with free hands, language, tools, and seasonally unrestricted sex, their subsequent evolution ran from those initial compartments.

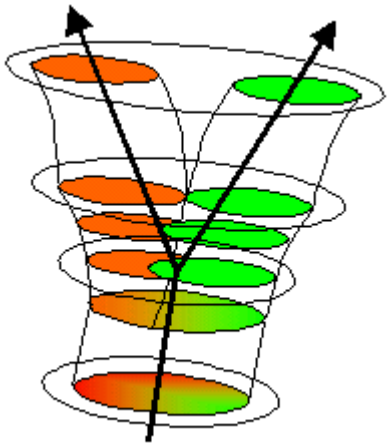


Figure 32.3

In the course of evolution, however, overlapping may happen, as **Figure 32.3** illustrates.

Here, the evolutionary split is presented as both part of an ascending tree (straight lines) and a tube the cross-sections of which are Venn diagrams with a part where the transition forms overlap. Each subdivision carries the halo of its origin into the future.

Of course, the cross-sections in the form of Venn diagrams make a wrong impression that there is a subset which is neither one evolutionary line nor the other. This is exactly why I don't like them but use as comparison.

The tree and the chest of drawers with partitions are two ways to visualize evolution. They are two different cross-sections of **Figure 32.3**: along and across. The difference is that the tree has the time dimension: it grows and forgets its past. The drawers preserve the static design: there was a classification in the beginning and it remains the same over time, only more detailed. The time sequence of events is erased.

The tree makes an impression that the past has been erased and written over by the present, which is, of course, how it is. Only the tips of the branches exist today. The drawers make an impression that there is nothing new under the sun, which is, of course, only half-truth. But this conservative half of the truth is of primary interest for me here. I am interested how the content of a particular drawer changes with time under the same label.

The chest allocates space for the future not yet existing species. In the tree representation, a new branch splits off the old one; in the drawer representation, a new partition appears.

The question arises: if everything competes for space, energy, and matter, how can it be that the number of categories of classification increases with time? Various answers can be given, for example:

> the categories multiply but the populations of individual species shrink to give space to others;
>
> the increased supply of energy sustains a larger variety of subdivisions;

> the categories coalesce, form something like continuum, and the differences between them decrease.

I prefer the answer inspired by Edward O. Wilson who noted in his *The Diversity of Life* that only groups of organisms are real while the larger categories are abstractions ("Categories are the abstraction, taxa the reality," p.153). While particular species of objects (Bermuda grass) are real, larger categories (grass) are abstractions. We cannot find a lawn with Bermuda grass side by side with a lawn with "grass." Naturally, abstractions do not compete for either energy or matter.

The difference between evolutionary tree and systematic chest of drawers may seem purely symbolic. But there is a substantial distinction: the tree is continuous by definition. The chest does not require its content to be changed gradually. The old things can be thrown away; the drawers can be empty for a while; something can be just dropped in, no question asked. The tree does not make humans look as a necessary branch. Their drawer, however, is labeled "humanoids" from the start. The drawer is something like Platonic ideas. If no question asked, no philosophic questions, either. The drawer is simply a cross-section of a new branch of the evolutionary tree.

There is, of course, a problem. The tree is always correct because it reflects observable facts. The drawer is a product of our mental activity which may progress in the future, so that the way we label the drawers will change. For example, we say "humanoids" because we have robots. In fifty years we may have something of which we don't have a slightest idea today. We will understand its place in evolution with a hindsight. Will that novelty fill the old space or will we have to add a completely new large section? This is an intriguing question, which I would answer tentatively in the following way.

If our civilization remains human, then human nature will determine its compartments. If the future civilization includes other forms of non-biological nature, an updating may be possible. My general point of view is that the biological evolution is not sufficient to cover the entire evolution of humans. Someday we will have to add Technos (Things) to Bios (life) and the evolutionary tree of civilization and, at some point, to record the split between the humans and the Things.

In other words, we can anticipate a new powerful tree of Technos branching off the three of biological life at the point of appearance of humans. The entire tree of evolution will suddenly change its meaning. Biological life will be perceived as just one form of meta-life.

NOTE (2016). Will we then regard humans as a branch of the much older Technos, i.e., humans will be more like a branch of machines from the start? Will we see life as a branch in the evolution of machines? We can, actually, see it this way even today. To be machines, humans only need to be predictable and so they are to a large extent, especially, with digitalization, globalization, and standardization. This is why I recognize Donald Trump as a fruit on a familiar pattern branch and I am worried.

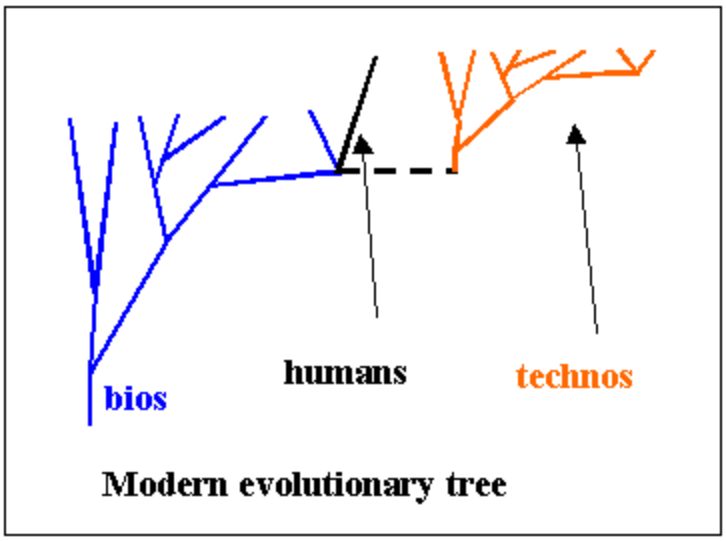


Figure 32.4.

Figure 32.4 attempts to show how the humans start a completely different evolutionary three of technology at the very diffuse moment of their appearance.

Similarly, the tree of language, not shown here, springs up. With it comes a different evolutionary tree of ideas that left some material artifacts in the form of burial rites. Immediately, the tree of art leaves its first imprints on the walls of the caves and starts its own evolution toward the present fusion with technology and junk.

The evolutionary tree of human civilization becomes very complicated. This is where the idea of compartments comes handy, with a separate tree growing from each drawer, as from a set of planters, and all of them growing from the checkered garden of human nature, itself a plot on the continent of life.

The actual, not taxonomic, tree of biological evolution is not as straightforward as it looks, either. There are separate evolutionary trees of biochemistry, skeleton, digestion, muscular system, vision, hearing, nervous system, behavior, and others, which spring up at different time moments with certain innovative species and grow intertwined with the general taxonomic tree. We can say, again, that only species are real, and digestion and thinking are abstractions.

Once a primary evolutionary branch appears, a certain parcel, taken out of endless wilderness, is posted on an imaginary Venn diagram and its further cultivation and partition follows.

The macabre topic of public executions, probably, inspired by the enormity of violence in American entertainment, served me as an introduction into a more general topic of stable patterns of human nature.

The evolution of the attitude to cruelty from common and public executions to rare and private executions and further to protection of animals tells me that culture is a chest of drawers: the content of the drawers changes, they are subdivided by new partitions, but something is always stored there. Not only the large compartments, in this case, public entertainment, are never empty, but their smaller nooks, like display of cruelty and sadistic urges, are filled, too, with new evolutionary progeny.

Learning more about history, I came to the conclusion that, in addition to impersonal patterns of history, there are also basic general structures centered around the design of the average human. As much as the average human being needs bread, circus, and sex, it needs to obey, command, stand out, and blend in. What else does it need? According to Paul Lawrence and Nitin Nohria in their book *Driven*, it is : **Acquire, Bond, Learn, Defend**. I think it is logical to complement them with opposites: **Give Away, Stay Away, Be Independent, Forget, and Share**, but, probably, not in the corporate and competitive atmosphere.

Another list can be found in *Sociobiology* by Edward O. Wilson (also this). Wilson is often compared to Darwin, but there is also something of Galileo and Bruno in his position, too, as well as of Don Quixote. He is one of a few noble figures casting long shades over the carpeted football fields of mass culture (Jaques Barzun is another; his *From Dawn to Decadence* is among the best books I have ever read about culture).

Here are some components of human nature shared with animals: division of labor, communication, learning, play, socialization, competition, aggression, territoriality, dominance, roles, castes, sex, parental care, and social symbiosis. All of them are institutionalized in human societies, whether by law or by tradition. What is different, however, is that institutions have a life of their own, free of any biological factors, and they interact with human not as part of their nature—the term interaction would be meaningless—but as external factor, comparable with that of climate and invasion of neighbors.

From this very different perspective, the drawers are close to the social facts of Emile Durkheim:

> Here, then, is a category of facts which present very special characteristics: they consist of manners of acting, thinking and feeling external to the individual, which are invested with a coercive power by virtue of which they exercise control over him. Consequently, since they consist of representations and actions, they cannot be confused with organic phenomena, nor with psychical phenomena, which have no existence save in and through the individual consciousness. Thus they constitute a new species and to them must be exclusively assigned the term social. Emile Durkheim, What is a social fact.

In a description of an individual or society *as a category*, they are blanks to be filled or, as I call them, the drawers. Entertainment is one of them. Power is another. Any human factor (motivation, drive, need, expression) creates an institution for its satisfaction. There are people who watch the show ant there are performers who need not watch but

perform. There are people who want to rule and there are others who want to be governed. That duality, often combined in one mind, according to my long time observations, is a noticeable pattern of Russian mentality.

Homo Sapiens seems to come from group animals. One of its close relatives, orangutan, however, is not much social and the genes of ultimate individualism might have come from animals, too.

There are essential properties of humans, as well as of the group, that change only form but not substance. Humans follow some basic patterns of individual behavior because they are genetically programmed to do that. This is the point of view of sociobiology. Among the individual patterns are aggression, mating ritual, attachment to children, domination, submission, competition, and altruism. The term "individual" is misleading because the "individual" behavior displays only between two individuals and is interactive, and so is human individualism. What we call a solo is in fact always a duo.

Culture is a separate form of life, with its own evolutionary tree, and it interacts with our biological patterns. It could be that the drawers of culture are in one-to-one correspondence to our biological drawers and have the same labels. But I don't see in our biological nature anything like trade, truth, regrets, philosophy, and poetry. Culture can be, like in the Victorian England, rather counter-natural, at least from our modern point of view. The current culture of Things may seem counter-natural from some future point of view, and I am close to viewing it this way.

I started with acknowledgement of my confusion. Part of it, as I believe, comes from the current historical change in culture, technology, and very principles of human civilization. On many counts we are in the overlapping areas of Venn diagrams. Fifty years from now, most of the picture will be clear to those who will look back. I am pathologically impatient.

APPENDIX

Nikolai Gogol, *Taras Bulba* , online text, page 125.

The square on which the execution was to take place was not hard to find: for the people were thronging thither from all quarters.

In that savage age such a thing constituted one of the most noteworthy spectacles, not only for the common people, but among the higher classes. A number of the most pious old men, a throng of young girls, and the most cowardly women, who dreamed the whole night afterwards of bloody corpses, and shrieked as loudly in their sleep as a drunken hussar, missed, nevertheless, no opportunity of gratifying their curiosity. "Ah, what tortures!" many of them would cry, hysterically, covering their eyes and turning away; but they stood their ground for a good while, all the same. Many a one, with gaping mouth and outstretched hands, would have liked to jump upon other folk's heads, to get a better view.

Above the crowd towered a bulky butcher, admiring the whole process with the air of a connoisseur, and exchanging brief remarks with a gunsmith, whom he addressed as "Gossip," because he got drunk in the same alehouse with him on holidays. Some entered into warm discussions, others even laid wagers. But the majority were of the species who, all the world over, look on at the world and at everything that goes on in it and merely scratch their noses.

In the front ranks, close to the bearded civic-guards, stood a young noble, in warlike array, who had certainly put his whole wardrobe on his back, leaving only his torn shirt and old shoes at his quarters. Two chains, one above the other, hung around his neck. He stood beside his mistress, Usisya and glanced about incessantly to see that no one soiled her silk gown. He explained everything to her so perfectly that no one could have added a word.

"All these people whom you see, my dear Usisya," he said, "have come to see the criminals executed; and that man, my love, yonder, holding the axe and other instruments in his hands, is the executioner, who will dispatch them. When he begins to break them on the wheel, and torture them in other ways, the criminals will be still alive; but when he cuts off their heads, then, my love, they will die at once. Before that, they will cry and move; but as soon as their heads are cut off, it will be impossible for them to cry, or to eat or drink, because, my dear, they will no longer have any head." Usisya listened to all this with terror and curiosity.

2002

Essay 33. The Corg

[corporate organism, democracy, monarchy, corporation, Hanseatic League, EU, NAFTA, Niall Ferguson, John Kenneth Galbraith]

This Essay is closely linked to **Essay 32, The Split** where I tried to look at the evolution of life and society from the point of view of *Ecclesiastes: "there is nothing new under the sun*."

The main thesis of this Essay is:

The corg (corporate organism) is a kind of a non-governmental organization. It is a product of a long evolutionary history that has been overshadowed by the history of the national state. Tomorrow the corg may come to the foreground of history as a form of organization competing for power with the government. The corg works as a private business corporation manufacturing social change or its absence. This is the paradox of the corg: it is organized as a corporation but it does not make Things for sale. The corg is a private government outside the public government.

I saw the progress of civilization as development inside predetermined "drawers" (categories, domains, taxons) of human nature. The original drawers are partitioned and sub-partitioned into smaller drawers in the course of evolution, but they remain unchanged. One such primeval drawer is the drive for power. Here I am trying to formulate my impressions of a new arrival to the old curiosity shop.

I am walking on thin ice in this Essay. Power and politics is a difficult subject for me because I am still discovering how it is done in America. I am not fit to do any real research, I find the subject boring, and I can rely only on myself. This Essay is just an idea, which may be new, but, most probably, old, and I may be right, as well as, most probably, wrong. It could be just a phantom. I have plenty of reasons for confusion and doubt. This Essay is a CAT scan of a kind: many X ray shots are taken from different angles—this is why it is repetitive—but the compound picture is still ambiguous. I will go in circles, like the X-ray tube in the scanner.



Is the subject important? My attitude to history is fatalistic: I do not believe we can resist it and if a charismatic personality changes the course of history, it is because the course was about to change anyway. The flow of history is like the great ocean wave: it is capricious, dangerous, and unstoppable, but surfers can ride on it.

I call the emerging form of power **the corporate organism,** or **the corg** for short.

The problem with the corg is that it is right in the stage of splitting from the known forms of power. Any such transition can either complete the transformation, or return to the initial state, or take a quite unexpected turn. We see only those evolutionary changes that have already happened, but we overlook the transition states of those changes that had reversed their course so that the new evolutionary development was aborted. I believe that if the corg is a real and viable formation, the future dominant unit of power will be the corg: not the national government and not the individuals. One might too optimistically expect the multitude of choices in a supermarket from capitalist democracy. The political supermarket is more like the food shelves of a pharmacy, where one finds just bare essentials.

> "Lastly, we must consider the shape which the perfect embodiments of Spirit assumes—the State." (Hegel, *The Philosophy of History*, Introduction).

What a strange thing to say! Nothing is as external to an individual as the state with its inherent suppression of spontaneous human instincts. The power of state is enforced by army, surveillance, police, jail, executions, and even watchful neighbors. This power has always been concentrated in the hands of a few or a single person.

A crowd can spontaneously act in a synchronous way—not without dissenters—but only in a very limited number of simple situations. The power of a crowd is diluted over a large volume. This is something known in the physics of quantum objects: the large the area where a micro-particle can be found, the lower its energy. The crowd is efficient when it is an army, business corporation, or cult, with authority localized in a few commanders. And yet: "Society and the State are the very conditions on which Freedom is realized." (Hegel, *The Philosophy of History,* Introduction). I have to add that Hegel understood freedom as contingent on the willful conformity to the needs of society as a whole—an even more strangely sounding statement.

When we talk about capitalist democracy, the old idealistic notion of this social structure does not reflect the current situation. Democracy is about informed individuals who are aware of all available opinions. Most individuals today do not decide their own fate for at least two reasons: they are not informed and they are powerless unless assembled into an organization with a source of energy. In America their options are crudely cut to just two partisan alternatives. The attitudes of the electorate are outlined by the polls. The power today belongs to the groups who can put the issue to the vote or just enforce it on the public under the gun. It is neither good nor bad, just how it is. Nobody can offer any strong alternative.

In the evolutionary drawer of power we find tribe leadership, monarchy, dictatorship, and a multitude of other forms. It is also divided along such general categories as political power, social organization, and government. They all developed from the original human

quest for order in form of domination or submission. The drawer where monarchy used to dwell for thousands of years is even older than the wisdom of King Solomon, himself a monarch, to whom the words "there is nothing new under the sun" are ascribed. A sports and entertainment star is also there: the king of rock and roll, the queen of pop, the movie star, empire of sleaze.

Up to present, the national or multinational state has been the ultimate form of social organization. Its formation from previously independent units—as well as decay and fragmentation—constitutes most of recorded history. Looking back at history, I begin to think that the state came to being with the single mission of providing resources for ultimate concentration of power. For a fresh and colorful view of history in terms of power and money, see **APPENDIX 1.**

The supreme state power varies from ultimate dictatorship to ultimate democracy. While the design of dictatorship is as transparent as some encased in clear plastic telephones and clocks, the mechanisms of democracy can be hidden under the table, disguised, and ambiguous. In fact, both are just the opposite ends of the same scale, like temperature. Dictatorship is on the cold side, crystallized in clear forms, and democracy is where the high temperature makes everything fluid. The strength of democracy is that it could be solidified in the times of war and disaster, i.e., effectively abolished. Its power, paradoxically, is not in the popular vote but in its non-democratic elements, in its ability to draft an army, make a loud noise, to impose regulations, and to punish.

The last decades have been a period of fragmentation of multinational states, as well as economic "federalization" of Europe (EU), with an attempt to do something distantly similar in North America (NAFTA). Something is happening in the ancient drawer labeled **POWER**. It is time of evolutionary change driven not by politics but by economy, i.e., by the society of Things and humans attached to them, whether physically or emotionally, or symbolically, as the Tramp in Charlie Chaplin's *Modern Times*.

The process had started with the development of capitalism, which took about five hundred years to present. The power has been gradually transferred from the sovereigns who could administer justice, levy taxes, and wage war, to those who were making Things for sale and who found it convenient to entrust the elected government with these functions. The centralized government, in turn, has been evolving further because of the eternal competition for power. It has been assumed that the competition for the seats in the government is the stage of vulnerability where the government can be kept in check, but all the assumptions on a historical scale could only be made for a short time span, until new assumptions take the place of the old ones.

Power has always been a risky business. A single crowned head is vulnerable to an ax, but a public corporation is too diffuse to be sent under the blade.

Today corporate power antagonizes a small part of society. There is an intuitive public feeling that a corporation can inflict immense damage on part of society but the positive effect, whatever it is, can be on a much smaller scale. The underground smoldering of

anti-corporate public feelings can be understood, but what should be understood in the first place is that to attack corporations means to attack history, and attack history means to attack human nature from which history grows. I have no intent to denounce corporations in any way, although I feel some aversion toward the digital giants and food and drug companies whose products I know firsthand. To denounce corporate greed is the same as to denounce human need of food or sex. My aversion comes from infringements on my freedom.

The player of current social game is not a king, of course, but neither it is an individual. The unit of power is group. The modern industrial democracy is a group democracy—groupocracy—where groups compete for money and power by converting part of their money and power into means of competition similar to armies, fortresses, spies, alliances, and colonies of the past. The power map of the USA (I know little about Europe) can be imagined as the map of Medieval Europe with its constantly changing and very diffuse borders. The borders between groups today are mostly invisible and not territorial, but the permanent war, hot or cold, goes on. The groups compete for power as the European principalities competed for land. The political "land" is constituency, which does not change sharply over a short time. The economic land is money.

The essence of the historical revolution—transition to modern capitalism—can be expressed in terms of geometry as the transition from the competition for the two-dimensional land to the competition for the one-dimensional money.

Monopoly as a new form of monarchy is still very rare. It is never popular because it is anti-democratic even in groupocracy. Nevertheless, monopoly as form of ultimate domination is in everybody's Freudian depths, although only Government, Inc. has it.

The most conspicuous example of a group is corporation. But I do not mean by the **corg** any carrier of the legal definition:

> A corporation is a business or organization formed by a group of people, and it has rights and liabilities separate from those of the individuals involved.
>
> In the eyes of the law, a corporation has many of the same rights and responsibilities as a person. It may buy, sell, and own property; enter into leases and contracts; and bring lawsuits. It pays taxes. It can be prosecuted and punished (often with fines) if it violates the law.

Common corporation is regulated by the law of the state. The corg runs as a corporation but not of this kind. What I have in mind is any non-democratic organization that uses financial resources to pursue a corporate **non-commercial** goal.

The corg embodies the principle of privatization of government. It is a private body that shapes the politics and the laws.

The corg is somewhat close to a legitimate corporation bent on social responsibility, law-abiding honest business with a social agenda, congress lobby, political party, non-profit

organization pursuing a social or environmental issue, a Christian Right organization, terrorist organization, and ACLU.

The corg, it should be immediately noted, is a form, not a substance, and the categories of good and evil do not apply to it as they do not apply to molecules, flies, monarchy, and democracy. The Nazis in 1933 were in charge of a democracy, which they immediately destroyed.

The corg is just a form and it can be filled with different content—humane, liberal, and progressive, as well as destructive, discriminatory, and inhuman. I have a feeling that the spreading animosity against big corporations is misdirected. It should be directed against substance, not shape and size.

The corg is outside the categories of good and evil, but it is capable of both. It is not the goal that makes a group a corg but the type of the goal: power to influence social order, for better or worse. This is why I do not judge any corg by its nature but entirely by its results.

Some terrorist tendencies in the anti-capitalist movements are very symptomatic. They tell me that a new destructive corg could be born, if only a source of money could be found. The anti-abortion forces look to me like a mini-Al Qaeda and they were weakened by the same means as the maxi one. Al Qaeda is the purest form of the corg I can name. It had predecessors in the West European terrorist movements. There are a whole lot of factors that make modern destructive corg vulnerable. Its future survival tactics could only be constructive, at least, as disguise.

The corg is vulnerable not just because its supply of money can be cut. Unless it is driven by a charismatic personality, the chances of its success are slim. Corg needs a single, preferably, unopposed mind. It must plan for life, not for the term of office. The fate of the corg as group is within the internal world of the leader. The corg may die with its leader.

The corg is right on its way from non-existence to existence and I cannot point to any existing corg in particular. We know very little about Al Qaeda, but there is a much larger list of constructive and progressive pre-corgs, among which I would place even National Public Radio in the US, although it has no political agenda. It is simply in the business of counteracting the flow of ignorance, mediocrity, and Coliseum-style entertainment. Microsoft is also a pre-corg because of its immense financial power and its Orwellian way of controlling the customers. By its very presence, it warps the entire business landscape because it monopolizes the biochemistry of the nervous system of business. The billions of dollars of its humanitarian and corg-free foundation are dwarfed by its effect on the way society deals with information. It is like appropriating human language. It is still impossible to interpret the social effect of Microsoft in terms of good and evil: a common language seems a blessing.

The companies that own network TV are already in the corgial business: they stand between the source of information and its receptors. This digital mesoderm is the sign of time. Modern technology is always the third person in the bedroom (see **Essay 15, On ménage a trois in the Stone Age**). The corg spins off bias as the spider spins its web.

What is common for the strange new social form that grows like a form of alien life in the petri dish filled with money is that it is centralized, not regulated by any government, controlled by a single person or very few, has an apparatus for procuring financial support, and has modern means of instant communication and information processing. Although most pre-corg organizations have slim budgets, it is the general wealth of American economy that provides the rich substrate.

Greenpeace International had a $145 million budget and offices in 35 countries in 1998. With a budget of 1.45 billion, Greenpeace could have a much higher effect, and with 15 billion it could, actually, rule. It is not the budget, however, but the clever and sharp application of a limited budget on a few sensitive points of society that can make a corg for a while effective. For comparison, budgets of most Religious Right organizations are on a smaller scale, although some are large: *Focus on the Family* $121 million; Pat Robertson's *Christian Broadcasting Network*, $196 million; *Campus Crusade for Christ*, $360 million, negligible on the Microsoft scale. What the numbers do not tell is how much of it goes to the leaders and the staff. Some of such organizations are characterized as aging empires.

In my imagination I see a blurred picture of a new social animal: a centaur-like hybrid of corporation and individual, a robocop of a kind. Whether this animal exists as I see it, I do not know. But I can see its genetic composition and converging lineages.

The modern national state is a product of the evolution of monarchy. Even democracy can be regarded as a kind of constitutional and elected monarchy, as the American cliché of "the most powerful leader in the world" implies. The king and the elected government are in the same large drawer of power. The corg may reside there, too, in a small compartment, from which it could make inroads into modern history.

An original domain of human nature cannot disappear without evolutionary progeny. If Roman Coliseum evolved into the video store and the gladiatorial fight into the movie *Gladiator*, what happened to monarchy? Where is it hiding in the modern industrial state? Certainly not in the Buckingham Palace.

The closest Medieval predecessor of the corg is the autocratic leader or the prince, following the English translation of Niccolo Machiavelli's famous book *Il Principe* (English text). Prince comes from the word *princeps*, which is a combination of the Latin *primus* (first) and *ceps* (taker; from Latin *capere*). Today it could be spelled **prinCEO.**

For the prince, the state and society is not external: it is within the boundaries of his own person. The phrase "I am the state" (*L'Etat c'est moi*), ascribed to Louis XIV, the Sun King of France (1643-1715), exemplifies the personal power. Throughout history the power of the prince was mostly limited in one way or another. The prince always had to expect challenge either from "nobles" or from "people," as Machiavelli noted, and had to control both—a situation somewhat similar to the CEO of a modern corporation. Nevertheless, even democratically elected leaders (Machiavelli, Chapter IX: "where a leading citizen becomes the prince of his country, not by wickedness or any intolerable violence, but by the favour of his fellow citizens") could have power comparable to that of the Sun King and Genghis Khan.

Autocracy had been the standard form of social organization (and, by the way, family) for many centuries. Most of human history has been tied to the lives of pharaoh, prince, king, shah, khan, and czar. Autocracy ruled the earth. What happened to this powerful evolutionary form? What is growing from the ruined or restored imperial palaces?

I see the corg coming from the Medieval aristocracy, the nobles, as much as from monarchy, which is natural because monarchs used to come from aristocracy. The typical noble tries to influence the prince and thus to appropriate part of the royal power. A favor is exchanged for a favor, as in American campaign contributions.

The change I am interested here is very recent: the national state has been transformed from monarchy into corporate society where the main holder of power is corporation: a pool of authoritarian power in the sand desert of democracy, a leader at the top of a small pyramid of power.

Formally, the state power is split between the branches, but the executive power comes closest to that of the prince because it is concentrated in a single person on top of his or her cabinet. The president and prime minister, however, do not have a complete power over what is the very foundation of their activity: money. The nation is not their property. Their right to govern does not come from heaven: it comes from the wealth of the state subjects or citizens and their willingness to be taxed.

> "It is necessary to consider another point in examining the character of these principalities: that is, whether a prince has such power that, in case of need, he can support himself with his own resources, or whether he has always in need of the assistance of others." Machiavelli, Chapter X.

This is something the founding fathers of America did not anticipate: concentration of wealth not just in the hands of a few, which is quite natural (see **Essay 31, On Poverty**) but in groups that mimic the bygone autocratic states and principalities.

As industrial democracy became possible because of accumulation of wealth, the corg comes to historical podium because of the concentration of wealth and because of the amplification of the power of an individual who is the authoritarian head of a group with

its own resources. The leader wears his corg as a medieval knight his armor. The modern armor, however, looks more like that of a cyborg.

It seems to me that society is moving toward a new phase where the corporations and corgs play the role of former national states. They fight, conquer, surrender, merge, split, and divide the space of influence. The corporations are engaged in the sphere of production and business, whereas the corgs can pursue a wide and indefinite range of agendas in the sphere of social order. By order I mean thermodynamic order, which simply means **a certain order** as distinct of **chaos** or **another order**. If the individuals can vote at all, it is for a limited number of choices presented to them by the corgs.

I find it strange to speak about freedom of choice if the choices are not my own but are imposed on me. Freedom is my personal vision of it and not somebody else's. I realize that this is an idealistic and impractical view, but freedom is a separate and inexhaustible subject.

By voters I mean not just national or state elections, which are rare and rarely too important, but also voters in various organizations, from corporate boards to government agencies, to Academy Awards votes, to Congress, whenever the decision is not made in an executive mode. The corg has also lobby genes in its genotype. Thus, Hansa was a lobby for Baltic based trade and Al Qaeda seems to be a lobby for the American withdrawal from Middle East.

The corg, therefore, is no different from a manufacturing corporation: it manufactures social change by formulating the choices and beaming them on voters.

The corg—corporate organism—is as related to the great empires of the past as lizards to dinosaurs. Whether the tiny gecko or Komodo dragon, the political descendants of the imperial dinosaurs live happily amidst the capitalist democracy and global porosity of borders, becoming its inherent apparatus, like cellular organelles.

Many lineages produce the final genetic mix of the corg. The corg traces its genes to any formation with social agenda. Among them are political and non-political organizations, from the Jacobins to the Bolsheviks, from Free Masons to the Green Peace, from Jesuits to Henry Ford with his anti-Jewish agenda, from the medieval Hanseatic League in the Baltic to Alfred Nobel with his endowment, from the Fabian Society in England to the Nazis before they took power, from Marx's International to Al Qaeda, and from Yihetuan (Chinese "Society of Righteousness and Harmony" around 1900) to the German Green Party , which is far from the end of the list.

I would put on the list of related (not exactly corgs!) entities Enron, George Soros (not on the negative side of the moral spectrum; George Soros is one of modern prophets for whom I feel great respect), Charles G. Koch and David H. Koch, today commonly referred to as the Koch brothers, AOL-Time Warner (promises to become another

Microsoft). IMF, Sierra Club, FoxNews, and even the gang of Robin Hood. The reason why I do not mention the Saudi government, Taliban, and American President, all of whom create strong gravitation fields in world politics, it is because corg is never a part of government. The corg creates a kind of power field that could strongly distort—for better or worse—the national attitudes and warp the political and economic landscape. But the corg never belongs to establishment. It is a form of opposition, which is one reason why it can draw sympathy.

I would say that pre-corgs even coexisted with the kings, and the best example is Papacy, as well as other influential religious movements, not as everlasting, however, as the Catholicism. Even within the Church there were corg-like religious orders, the most eminent of them the Jesuits. The independent corg-like character of Jesuit organizations even brought them into conflict with the Catholic lay powers.

When I use the Present Tense, I am looking into the future.

What makes a corg a corg is that:

> it does it not by ideas, persuasion, and eloquence but by hard work and spending,
> it is informal, even if registered,
> it is neither hired nor controlled from outside,
> it is managed as business,
> it has a single or narrow source of financing.

The modern initial link is in most cases a charismatic personality who builds up his corg. The final link is the government reduced to the employee of the society of corgs.

In short, corg is an evolutionary alternative to centralized government. The society of corgs marginalizes both the populus and government because only the corgs have real power coming from independence and money. It is the informal status of the corgs that positions them outside the government regulations. They reap the fruits of capitalist democracy. They are similar to viruses, not necessarily harmful, and some are useful symbionts.

The corg is a mini-state: not a state within a state, but a state in the sphere of ideas and agendas beyond geographical borders. The corg has a source of money and it transforms its energy into work on a change of the existing social order, not always radically—but definitely not on production for profit, unlike business organizations. The corg is the **industrial** unit of social change: it produces bits and pieces of change like a manufacturing company produces watches, a Hollywood studio produces movies, Microsoft produces software, and a political party pushes legislation.

For most of history, social order was the prerogative of the government. The corg takes it over. The government becomes a gauge of the balance of influence between the corgs. The most profound and lasting effect of Al Quaeda is not even the terror and destruction but the way it changes the governement functions of the leading superpower on earth.

I see this evolutionary move as the cooling of the turbulent human history full of wars, violence, and conquest. The society of individuals is half utopia and half illusion, and Friedrich Nietzsche made this a point of his own agenda. Power is powerful only when it is concentrated. A single voter in democracy is powerless because the outcome of his or her vote depends on how other—completely alien—people vote. A single person who wants to make a difference must not only join a group but also support and direct this group, which an individual can do, as an exception, by eloquence and, as a rule, by the brute force of money. Nobody hears any eloquent appeal if it is not in the media. It was possible in class societies of the past where aristocracy or even democracy could be all gathered if not under a single roof, then on a single floor.

Corg is a new, fragmented and particulate form of previously solid authoritarian power. Of course, it is not completely new in its substance. It is its relation to national state which is new. It looks like the corg has absorbed all the juice of autocracy lost by the dried off monarchs, princes, khans, and glorious bandits of the past. Corg is a charismatic, ambitious, and dominant personality that controls an army equipped with the modern weaponry of sophisticated finances, production, and communication. The new circumstance is that the corg could be incomparably smaller than the state. It uses the amplifying power of the state, its media and mass psychology, to produce a lot of bang for a buck. Moreover, the corg is not strictly territorial: it has no national borders and no exact spatial borders at all.

If not exactly corporation, then what is *corg*—corporate organism—and what makes it organism? It is exactly what makes us organisms: central nervous system, code, and coordination of functions with the external world and each other. The corg has all the physiology a good Prince was endowed with as a mortal human. It eats, moves, plans, and remembers.

The corg combines properties of corporation and individual. This is why I regard it as organism.

Another property of the corg that makes it an organism was noticed by Albert Speer, the Nazi minister and Hitler's friend who at the Nuremberg trial (there are links only to a small number of documents) after WWII outlined the universal principles of the totalitarian mechanism, see **APPENDIX 3**. This property of turning an employee or volunteer into a robot is the general corporate trend. Modern corporation, always fighting for its survival, recruits an army of people trained not to ask questions.

What makes the new form of social life possible? What makes a corporation a corg? Money, of course, but there has been always concentration of money and power throughout history. The new factor is something else: instant communication between

members. This is the property that made humans biologically possible: they convey messages through speech, and if they are at distance, through radio waves. Corporation acts as a single organism governed by mind. This ability of instant coordinated action of many people makes the corg comparable in its effect with military forces. It was telephone and radio that made the world wars devastating and dictatorship stable.

The corgization begins with communication. Communication dramatically increases the probability of improbable events. This change of probability, equivalent to a lot of physical work, is achieved at a low energetic cost. An army must move, provide logistics, and burn fuel. Communication does the same on shoestrings.

The corg is recognized by what it produces. The product of the corg is changes in culture, social and political relations, and social norms. Of course, a corg does not start from scratch, but tries to modify what exists. Corg is a tool working on civilization in the same industrial way as any machine. It cuts, bents, drills, and stamps away social forms. As Emile Durkheim would say, corg manufactures social facts. This kind of goods may be just a byproduct of making cars, computers, and drugs.

Corg is an evolutionary machine designed to control, direct, and speed up immaterial structure. It not just instills fear, hope, cruelty, compassion, learning, faith, and vandalism, but aims at changing the existing order. The Jacobins in France and Bolsheviks in pre-revolutionary Russia were evolutionary predecessors of the corg.

Most social genes of the modern corg come from monarchy. Initially, the king had all the rights and no responsibilities. The absolute leader reported only to God. Other examples are Medieval merchant guilds, for example the Hansa (see **APPENDIX 4**), created for the protection of trade. They were displaced by craft guilds, engaged in both manufacturing and trade of a particular range of products.

Curiously, craft guilds suppressed competition, advertisement, and innovation. In turn, they later surrendered their functions to the central government or were swept away by capitalism.

The modern vestige of guild can be found in the tenure in American universities which are turning into competitive businesses right before our eyes.

The corg:

1. Is not elected by the people and is not accountable to them.

2. Uses internal mechanisms and infrastructure of existing national form to grow and function.

3. Corg, unlike the king, does not need the whole country to arm and feed its men and its horses. It does not need either a regular army or a country with land, agriculture, and industry to support an army.

4. Pursues a social or political goal.

5. May act across national borders.

6. Is financed by contributions of supporters, not necessarily enthusiastic ones, by its own productive earnings, or by extortion.

7. Corg is as vulnerable as the rest of society because of centralization, communication, and financing, but mostly because it has enemies and does not have national resources.

8. Corg creates permanent instability of society, contributing to the general pace of evolution.

9. Corg is driven by the will of a single person, possibly, an oligarchy. It is an authoritarian or totalitarian structure, a descendant of monarchy.

10. Corg, similarly to organism, manifests practically instant internal communication.

11. Corg competes with the government for power, using the main natural law of democracy: maximization of customer base and constituency. You want to be elected? Give me an IOU for a slice of power.

12. It may seem a paradox, but the corg does not dictate the society what the people instinctively abhor. The corg always picks up a trend and a mood of a substantial part of the population. This is why the corg does not contradict democracy and is compatible with it. A king and a dictator can oppress his people. The corg is their voice. It is true about ACLU, Christian Coalition, Greenpeace, and even Al Qaeda.

In essence, corg is an individual with human extensions, similar to a manufacturing individual with tool extensions.

I see corg in terms of social thermodynamics. Thermodynamics in general operates with a limited number of concepts: energy, work, entropy, temperature.

The corg returns part of its financial power to society in the form of social work. The work is highly selective and can be destructive, as well as constructive. Work is meant here in the thermodynamical sense: selective change of order, as opposed to heat, which is a general and indiscriminate decrease of order. Work produced by the car engine makes the car move in a certain direction, as opposed to chaotic jerking and shaking.

The function of the sovereign was to direct the life of the subjects in an organized way and prevent chaos. Democratic government does the same. So does corg.

Therefore, corg competes with government (sometimes buys it or takes hostage). The corg becomes an interface, or amplifier, or a screen, or a funhouse mirror between the people and the government. The development of society in the direction of additional interfaces and mediators instead of immediate contact is a general trend and it could be seen even in the individual development of organisms (see **Essay 15, On ménage a trois in the Stone Age**).

Using free energy in the form of money to counteract the external political order, the corg cannot bring down the entire political system, as a revolutionary movement would do. Moreover, it does not pursue any such goal. It simply acts as a mini-government in its own interests. The corgs are like medieval principalities from which the European national states grew.

A corg does not know competitors because the corg monopolizes the objective. It is its single pursuer by definition. But it competes for the same energy and matter as anything else alive on earth and it can have enemies. Corg is not just about money, as any business corporation is. It is about power. The power is used to create chaos (terrorism) or create work (protection of animals).

Any business corporation is a potential corg if it pursues a goal not stated in its business program, produces unanticipated social effects, or simply accumulates large excess of money not involved either into business cycle or into employee compensation. Privately owned wealth, like nuclear materials, has a critical mass: above a certain value it generates a social effect (often constructive) well beyond its nominal dollar equivalent.

There must be a very simple reason why corg is emerging from the democratic state. Corg is impossible without democracy and liberalism. It needs freedom and the low transition barriers of capitalist democracy to grow and to cause big changes by small actions. It needs the lazy bureaucracy to attach the monetary tentacles and to crawl under the fences: one cannot buy the king.

When I was young, I was looking into the future with hope. I expected a better life, new exciting inventions, and new captivating art. As a historical fatalist, I am aware of the age effect : the old people evaluate the future in terms of old standards and they are mostly disappointed. I believe that history is always right because it grows from human nature. Nevertheless, my attitude toward the future has a tinge of aversion. I want to believe that this is because my individualism is much stronger than my fatalism.

Freedom is not the freedom of choice, I begin to think. It is the freedom of inventing the choice.

To conclude, let us look somewhat farther into the future. One of the main ideas of my Essays is that our civilization is driven by the evolution of Things, in which humans more

and more play the role of enzymes. What can come next after the Things in the leading position? I believe it is ideas materialized as corgs. Ideas are as old as Things. The time may come when they take over.

More about corg: **Essay 35. Crowds and Elites, Bottlenecks and Demons**

John Kenneth Galbraith was among the first to note the new historical role of large corporations, see APPENDIX 5.

APPENDIX

1.

An extraordinary, stimulating, heretic, and skeptical book on the historical aspects of power and money: **Neill Ferguson, *The Cash Nexus: Money and Power in the Modern World, 1700-2000*, New York: Basic Books, 2001**. Neil Ferguson, in his *The Cash Nexus*, among others, describes the fundamental historical transition from royal War State to democratic Welfare State, the origin of taxation and its role in the emergence of bureaucracy, and, most relevant to the corg problem, the politics that has become corporate business, which is just another way to explain what corg is. There is much more food for thought.

2. Machiavelli:

> It is necessary to consider another point in examining the character of these principalities: that is, whether a prince has such power that, in case of need, he can support himself with his own resources, or whether he has always need of the assistance of others. And to make this quite clear I say that I consider those who are able to support themselves by their own resources who can, either by abundance of men or money, raise a sufficient army to join battle against any one who comes to attack them; and I consider those always to have need of others who cannot show themselves against the enemy in the field, but are forced to defend themselves by sheltering behind walls. The first case has been discussed, but we will speak of it again should it recur. In the second case one can say nothing except to encourage such princes to provision and fortify their towns, and not on any account to defend the country. And whoever shall fortify his town well, and shall have managed the other concerns of his subjects in the way stated above, and to be often repeated, will never be attacked without great caution, for men are always adverse to enterprises where difficulties can be seen, and it will be seen not to be an easy thing to attack one who has his town well fortified, and is not hated by his people. (X)
>
> A prince ought to have no other aim or thought, nor select anything else for his study, than war and its rules and discipline; for this is the sole art that belongs

to him who rules, and it is of such force that it not only upholds those who are born princes, but it often enables men to rise from a private station to that rank. And, on the contrary, it is seen that when princes have thought more of ease than of arms they have lost their states. (XIV)

Returning to the question of being feared or loved, I come to the conclusion that, men loving according to their own will and fearing according to that of the prince, a wise prince should establish himself on that which is in his own control and not in that of others; he must endeavor only to avoid hatred, as is noted. (XVII)

3. Albert Speer, *Inside the Third Reich*. NY: Touchstone Books, 1997.

page 520: In my final speech I said:

Hitler's dictatorship was the first dictatorship of an industrial state in this age of modern technology, a dictatorship which employed to perfection the instruments of technology to dominate its own people... . By means of such instruments of technology as the radio and public-address systems, eighty million persons could be made subject to the will of one individual. Telephone, teletype, and radio made it possible to transmit the commands of the highest levels directly to the lowest organs where because of their high authority they were executed uncritically. Thus many offices and squads received their evil commands in this direct manner. The instruments of technology made it possible to maintain a close watch over all citizens and to keep criminal operations shrouded in a high degree of secrecy. To the outsider this state apparatus may look like the seemingly wild tangle of cables in a telephone exchange; but like such an exchange it could be directed by a single will. Dictatorships of the past needed assistants of high quality in the lower ranks of the leadership also—men who could think and act independently. The authoritarian system in the age of technology can do without such men. The means of communication alone enable it to mechanize the work of the lower leadership. Thus the type of uncritical receiver of orders is created.

.....

A critical receiver of orders in a corporation would not work for long.

.....

"The nightmare shared by many people," I said, "that some day the nations of the world may be dominated by technology—that nightmare was very nearly made a reality under Hitler's authoritarian system. Every country in the world today faces the danger of being terrorized by technology; but in a modern dictatorship this seems to me to be unavoidable. Therefore, the more technological the world becomes, the more essential will be the demand for individual freedom and the self-awareness of the individual human being as a counterpoise to technology. ... Consequently this trial must contribute to laying down the ground rules for life in human society."

.....

page 524:

Dazzled by the possibilities of technology, I devoted crucial years of my life to serving it. But in the end my feelings about it are highly skeptical.

4.

What was the **Hanseatic League** (or Hansa, German: Hanse)?
I found a good reference on the Web and because I am afraid it will disappear, I want to quote it. True, this page will disappear, too.

> In historical research, the Hansa had a long shadowy existence, for when interest concentrated on princes, powerful realms and heroic battles, a loose community of towns mainly inspired by mercantile considerations attracted little attention.
>
>
>
> Its definition was a problem already under discussion in its time. After having deteriorated since the middle of the 15th century, English relations with the Hansa reached their lowest point when in the summer of 1468 English ships were seized in the sound by Danish vessels. The Hansa was suspected to have at least shared responsibility for that. King Edward IV straight away imprisoned the Hanseatic merchants in London and confiscated their goods in order to compensate the English merchants. The Hansa, he explained, was a society, cooperative or corporation, originating from a joint agreement and alliance of several towns and villages, being able to form contracts and being liable as joint debtors for the offenses of single members.
>
>
>
> According to a widely held opinion, the Hansa was a community of low German towns whose merchants participated in the Hanseatic privileges abroad. Where politically convenient it stressed the solidarity of its merchants, and at the latest since the Lübeck meeting in 1418 there were repeated efforts to obtain a firm federal constitution. On the other hand, the Hansa was lacking the essential legal elements of a federation. There was no pact of alliance, no statutes, no obligation for certain economic and political aims, no chairman with representative authority, and no permanent official, until Dr. Suderman became Hanseatic syndic in 1556. And there were no means to punish disobedient members apart from exclusion, whereas instruments to be used externally were blockade, embargo and even war. So the Hansa in some way resembled a federation, but it was more a legal community as to its privileges abroad.
>
>
>
> Prof. Rainer Postel, Bundeswehr Universität, Germany

5. John Kenneth Galbraith, *Annals of an Abiding Liberal, New York:* The New American Library, 1979. First and last Essays.

> The modern corporation internationalizes its income and wage standards as entrepreneurial industry never did. It also creates an international civil service—men who, like the servants of the Holy Church, are at home in all lands, who differ only in owing their ultimate allegiance not to Rome but to IBM (p.17).
>
> The competitive and entrepreneurial firm seeks services from the state; seeks protection from competition, as just noted; is subject to regulation; pays taxes. This is a familiar and limited relationship. This firm never, by itself, competes with the state in the exercise of power. The modern large corporation, on the other hand, has a far wider range of requirements from the state. It also brings

> its power directly to bear on the instrumentalities of the state — both the bureaucracy and the legislature. Its needs, since they are put forward by the technostructure — an influential and articulate sector of the population — have a way of becoming public policy. Americans have recently had a substantial education in the way the financial resources of the corporation have been deployed for the purchase of politicians and political influence. (p. 18)

And much more there. Gailbraith has a rare ability to make his ideas look naked while dressing them in exquisite eloquence.

That was (and still is) the fuzzy state of corg genesis.

Galbraith used the term **power** without definition. He thought that large corporations diffused power because nobody personally had it: power is delocalized (using the language of physics) among management, bureaucrats, specialists, and services.

I believe that corg is always small (even if part of a larger body) and it amplifies personal power. It fits the sharp distinction Galbraith draw between small ("entrepreneurial") companies and large corporations. There is always an entrepreneur inside the corg. What is new is the challenge of the state (and, possibly, even large corporations) by a political entrepreneur.

But what is **power?**

6.

The End of the Nation-State. By Jean-Marie Guehenno. Translated by Victoria Elliott. University of Minnesota Press. 1995
The End of the Nation State by Kenichi Ohmae, New Yok: The Free Press, 1996 (London: HarperCollins, 1995).

2002

NOTE (2016). This Essay is very sloppy. In 2002 I was unable to clearly formulate and illustrate my idea. I still am. The Koch Brothers and George Soros work in opposite directions, of which I sympathize with only one, but this is exactly what corgs do: they damper each other's strategic effects. The relatively recent phenomenon of the charitable activism of billionaires (*The Giving Pledge*) who set their narrow and multiple goals, exercising personal choice and power, often preferring anything but internal USA problems, adds to this diffused unfocused picture. But the idea that corgs are private governments, mostly authoritarian, still remains in my mental picture. I am becoming more intuitively certain that the third party is what the US political system needs for stability and efficiency. This idea has been already voiced almost--but not quite--seriously.

We are sitting on a two-legged bench.

Essay 34. On Loss

[evolutionary loss, second law of thermodynamics **]**

Imagine a space traveler who came to Earth from another galaxy to compare his/her/its observations with those of another traveler who had visited the planet 3000 years earlier. The major observable change would be an immense expansion of all earthly man-made Things.

For the last ten thousand years, the humans have not acquired an extra eye or finger. The evolution of their Things, however, has been explosive. One can wonder if the Things are really theirs or it is the other way around.

Technos has populated the Earth in an insect-like swarms, but with much more variety. The kingdom of Things ranges from the pyramids and the inimitable cathedrals made of stone—the oldest and largest survivors—to countless disposable copies of the same design, for example, paper napkins. Technos supports a huge taxonomy of hierarchically arranged species, genera, families, orders, classes, phyla, kingdoms, and domains. Its abundance has been recorded in books, paintings, and films, which are also Things, as well as in the existing Things and old Things kept in museums.

I am not aware of any complete classification of Technos. There are partial classifications, for example, the Classification System of the Library of Congress . Here are some excerpts:

TECHNOLOGY:

General Technology
General Engineering, General Civil Engineering
.....etc.....
Electrical Engineering, Nuclear Engineering
Motor Vehicles, Aeronautics, Astronautics
.....etc.....
Arts and Crafts, Handicrafts
Home Economics

HOME ECONOMICS is divided into:

.
The House: Logistics, Finance, Care
Nutrition, Food and Food Supply

Cookery
.....etc.....
Mobile Home Living
Recreational Vehicle Living

TECHEXPO classification is more realistic:

1.Agriculture S&T (science and technology)
2.Astronomy & Astrophysics
3.Atmospheric Sciences
4.Aviation S&T
5.Biotechnology, Biomedical S&T
.....etc.....
13.Fluidics
14.Manufacturing Technology & Automation
15.Marine Engineering & Technology
.....etc.....
32.Subassemblies & Components
33.Surface Transportation

SURFACE TRANSPORTATION, for example, falls into:

Motor Vehicles Technology
Safety Devices
Surface Transportation Equipment
Traffic Control
Vehicle Electronics
Other Surface Transportation

There is also Standard Industrial Classification. It lists, for example, 100 subclasses related to the class COMPUTER, including services and occupations:

2761 Computer forms, manifold or continuous (excludes paper simply lined)
2791 Typesetting, computer controlled
3571 Computers: digital, analog, and hybrid
3571 Mainframe computers
.....etc.....
3572 Optical storage devices for computers
3572 Recorders, tape: for computers
3572 Tape storage units, computer
.....etc.....
5045 Computers-wholesale
5045 Peripheral equipment computer-wholesale
5045 Printers computer-wholesale
.....etc.....
8744 Facilities management, except computer

8744 Facilities support services, except computer
8748 Systems engineering consulting, except professional engineering or computer related

I suspect nobody knows how many species of Things are there on Earth. For comparison, there are between 2 million to 100 million biological species, probably 10 million. Only about 1.5 million are actually listed. Although many have not even been discovered, the biodiversity has been subjected to a terrible and, as some believe, catastrophic loss. According to some estimates, 600,000 species have been extinct in the last fifty years.

The decline of biodiversity is an example of the evolutionary loss which is normal in any evolution. The current accelerating loss of biodiversity is attributed to the competition, often barbaric, of humans with other forms of life.

The extinction of biological species, from an alien point of view, can be considered normal within the framework of the overall evolution on earth, which drives both Bios and Technos. "Why are you mourning the loss of so much Bios," the monotheist alien would say, "if you are gaining so much Technos? There is only one evolution on your planet and if it takes away, it also gives tenfold. You, pagans, worship two gods: nature and Things, plus numerous sex gods/goddesses." "No, we would object, we worship only one: money."

Aren't the humans compensated for the loss of Bios with the ever growing variety of Things, some of them even capable of simulating life? Is that variety really growing? What else are we losing? What are we really getting instead? Can we control evolution on the global scale? These questions are for serious researchers. They cannot be answered in a casual and superficial essay.

Yet the problem bothers me despite my evolutionary and historical fatalism. On the one hand, I would like all the pests, such as the two species of caterpillars that attacked my pines and tomatoes in the summer of 2001, to be gone forever, together with mosquitoes, termites, and carpenter ants whom I hate as my personal enemies. On the other hand, the holocaust of elephants, rhinos, and tigers deeply depresses me, although I would never want to meet any of them face to face.

A complete extinction of all large animals would not change my life in any way, and yet I would see it as a tragedy. Animals are our beautiful relatives, whether distant or close. Plants are our beautiful food and shelter. Looking for a rationale, I may argue that the depletion of biodiversity would make human existence on the scorched planet boring, bleak, and outright dangerous, but people learned to live in deserts of sand and snow. If we believe in evolution, there is only one Evolution and it is as much loss as gain. As individuals, we are going to lose our lives. We have already lost classical (i.e., recognizable as life and resonating in emotions) music and art. Why to mourn snakes and spiders? (I respect spiders and never kill one in sight. This is the only lasting effect of my prison experience.)

The loss of biological species, life, art, technology, ideology, institutions, and professions happens daily. The year 2001 alone will have on record enormous loss of life, Technos (in the World Trade Center), art (the Buddha statues in Afghanistan), and ideas (American ideology of domestic security), not to mention money and peace of mind.

How to measure gain and loss and what conclusions to draw from the difference between them require the mind of theoretical physicist with interests in non-equilibrium thermodynamics. It is certainly not a task for me. All I want is to take a closer look at the loss as universal phenomenon. What are we losing and how?

Is the following really happening—or it is just the eternal generation lag—and if yes, what is so bad about it, and if it is not bad, what is its significance?

Loss of attention to fundamental concepts of science

Loss of privacy

Loss of common world view

Loss of uniqueness by standardization, fashion, and assembly lines

Loss of new directions of inquiry cut in favor of the proven ones

Loss of direct face to face contact between people

Loss of common sense and long term goals

Loss of sophistication to life designed for dummies

Loss of simplicity (on tax code see Essay 18, On Everything)

Loss of courage, ambition, and non-conformism

Loss of categories of shame and honor

Loss of interest in the rest of the world

Loss of initiative, risk, and experiment

Loss of news in the filters of importance and priority

Loss of letters sacrificed to telephone and email

Loss of national state

Loss of purity (food, soil, air)

Loss of trust

Loss of education

Loss of loyalty

Loss of business independence (news, publishing, music, films, food, retail, etc.)

Loss of independence of expression due to political correctness

Each of the above can generate an Essay, but my interest here is more abstract.

The difference between the loss and the gain is fundamental: we know what we have lost but we don't fully know what we have gained until we lose it. This pattern of thinking can be attributed to Solon who said, according to Plutarch, that nobody should be considered happy until he dies: the last moment can change everything. The loss is all here to judge, while the gain is to be tested by time.

The loss of human life—death—was one of the most stimulating facts of human cultural evolution.

In the poor—by our standards—world of prehistory, death was, probably, the most tragic but also the easiest form of loss to cope with. By inventing the other world, completing the rituals of passage into it, and by maintaining symbolic links with the deceased ancestors, the complete loss of existence was prevented. The pyramids of Egypt look like monumental experiments with personal immortality, not without success. In the East, the loss was denied by the circular or cyclic concept of time.

We are shifting from the mystical polarity of life and death to the businesslike polarity of gain and loss.

There seem to be a whole taxonomy of loss. The following inventory of major classes could be regarded as a seed of a nonexistent philosophy of **nonexistentialsim**.

1. Entropic loss. A material object can be destroyed due to accidental factors or simply by wear and tear. It can be a unique piece of art or a carrier of ideas, as, for example, a manuscript, or its author. The range of this loss spans from large geological formations to an accidental destruction of a unique museum object and to a never saved computer file. Digital information can be accidentally and instantaneously erased without destroying the carrier, while information chiseled in stone can survive millennia. Stones, tablets, and steles die, too.

As its name indicates, this most universal type of loss seems to follow from the second law of thermodynamics, which says ...well, there are at least four major definitions, based on the concepts of energy, entropy, heat, and universe, see **APPENDIX 2.**

"Universe" sounds exciting, but we still do not know what it is. Heat and energy are not applicable to human relations and ideas unless defined in a special way. Entropy, or disorder (uncertainty) is the only one of interest for us.

It turns out that the Second Law of thermodynamics applies only to closed systems, which do not communicate or exchange in any way with other systems. Human civilization is not isolated in any way because it ultimately takes from solar radiation its creative energy ("free energy" is the correct but misleadingly sounding physical term). It also discharges heat into space and waste into soil and water.

It would take a lot of space to examine the universal extra-physical aspects of the Second Law, but there is a lot of discussion on the Web and in numerous books. In the very long run, everything obeys the Second Law, but the Second Law does not tell us how soon the loss is going to happen. I even suspect that it is a logical consequence of the concept of infinite time: **anything** can happen in infinite time, for example, an incredible order of life arises from the chaos of the primeval Earth. I am not really interested in what happens after ten thousand years, not to mention millions. This is the subject that could never be tested because the reality of a faraway future could not be compared with today's predictions: they will be **lost**.

One of the best sites on the Second Law belongs to Frank L. Lambert, [not anymore in 2016, but his name is worth Googling; see this.] not accidentally, a chemist. The answer to the question "when," regarding the Second Law, cannot be found in classical thermodynamics, but in the kinetics based on the concept of transition state. It has been my main obsession for many decades that transition state is the key to the scientific picture of history, sociology, and psychology.

In any particular case of destruction, for example, when a glass breaks, the irreversibility of the loss is the consequence of the nature and circumstances of the process. Thus, chemical bonds between the atoms of the glass are not simply disengaged so that the atoms can be in principle reconnected as in snap fastener or zipper. The free unbonded atoms immediately react with each other and molecules of the air. Besides, while the pieces scatter on their own as result of the impact, somebody has to bring them together from different points in the space. This is possible when a Thing is held together not with chemical but with mechanical bolts and nuts and if it falls apart, it can be reassembled. The snap (and especially the magnetic snap) is an ideal contraption that beats the Second Law for as long as it lasts.

The Second Law may be responsible for the overall loss in millions of years, but not in the short run and not in the presence of human hands. The wear and tear takes its toll simply because we accept it. We cannot fix the material decay because our hands are too large and clumsy to fix all the misplaced chemical bonds one by one. Instead, we resurrect the Thing from its code, and we can do the same by cloning organisms.

Anyway, "this bloody tyrant, Time," as Shakespeare called it, brings the irreversible loss, which is as accidental as it is necessary. What we really observe on the time scale comparable with the duration of human life is that everything falls into disrepair and malfunction, the less we spend work on maintaining order, the sooner. This is equally true of machines and individual humans. In the end, every **individual** object is lost.

The types, classes, and categories of objects—anything immaterial and existing only as idea that could not be measured with a yardstick and weighed on a scale—are very resilient to entropic loss, see **Essay 32, The Split**. But something can happen to ideas, too, see **Competitive Loss**.

Deliberate destruction by war, terrorism, sabotage, vandalism, and interference falls into this category of loss. Humans are dangerous neighbors of unique Things.

Why would anybody have a desire to destroy a life or a Thing or to deface the Great Sphinx of Giza? Herostratus burned the temple of Artemis, one of the Seven Wonders of the World, in 356 BC, to make himself famous.

I believe, it is related to the temperature of the social environment. Destructive urge rises not only in times of social unrest, but even among fans after a sports competition. Uncontrolled rage of animals is, probably, of the same nature.

A mass destruction of books and cultural artifacts happened during the fall of the Roman Empire in 5th century, Baghdad in 11th, North India in 12th, China in 13th and 20th, and Russia in 20th.

When temperature comes up, the laws of thermodynamics are nearby on guard, waiting to be called to the stand.

2. Evolutionary loss. Life exists in spite of thermodynamics. This does not mean that physical laws are violated by life, but some of them are not applicable to open systems for however long but finite periods. Life creates an impression of escaping the entropic loss by making multiple copies and experimenting with them. Each individual copy, however, is vulnerable and mortal. Even species are mortal because they change. Evolutionary loss is the loss of species, not individuals.

An object or entire species can be lost because of the constant evolutionary drift within a larger systematic unit. The mammoth had been extinct, but the elephant survived. Both are members of the order *Proboscidea*.

Everybody is mortal, but the humankind lives on.

Most prehistoric species of life, perishable artifacts of past civilization, old laws, customs, manners, folk art, and technology, like mechanical calculator, quill and inkwell, manual telephone switchboard, absolute monarchy, and ancient weaponry were lost to

evolution. The loss of Technos can be partially reversed by making new samples of the same species, unless the entropic loss destroys all descriptions and samples.

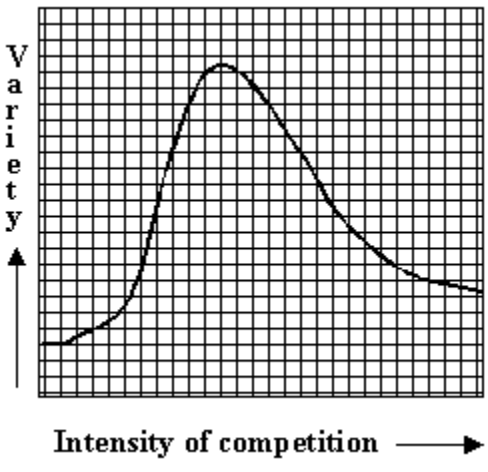
Each such loss occurs inside a larger and more resilient class of objects: a species could be easily lost, but genus, family, and order are incomparably more stable. The fountain and ball pens displaced the quill and inkwell, and they get along well with computer as a modern writing device.

Evolutionary loss makes objects obsolete. New Things take place of the old ones, while Art and Ideas simply pile up to be slowly leached out by the rain of years. The old Things pile up, cracking and rusting, in the lofts, basements, and flea markets, as the extinct in the nature and Technos species will concentrate in the zoos, botanic gardens, and museums. The fading manners, ideals, and traditions are catalogued by historians. Same happens with institutions, moral norms, and fashion: they are preserved in old books which someday will become endangered species, too.

For more about this type of loss, see Essay 32, *The Split*. It is as much loss as gain. The trick is that the wise alien was right, there is really one evolution for the entire planet, and the plants and animals must go without anything to replace them because they are not made by humans. When they are, as it is the case with artificial selection and breeding, the time to produce a new breed is too long for the fast metabolism of industrial society. There might be a separate kind of irreversible loss that is intrinsic to capitalist economy: competitive loss.

3. Competitive (selective) loss. That capitalism brings variety and expands consumer choice is one of the modern mantras.

Even remembering the miserable poverty of the socialist choice, I don't feel enthusiastic about joining the chorus. This may be true about competition but not always about the overall result. I suspect that the plot of choice versus competition looks like the bell curve.



Variety increases only until the competition reaches a certain intensity, after which the choice declines.

Probably, this idea has been already expressed or refuted. As consumer, I see the depletion of choice everywhere: in publishing, movies, supermarket, car design, and computer industry. The consolidation of the market goes on until the forces of concentration are balanced by the government anti-trust forces. There is another couple of opposite forces: to maintain choice costs money, and the desire to offer

choice is balanced by its cost.

I believe it is a myth that competition increases choice. By its very nature, competition must decrease it. This is the essence of competition: to narrow choice.

Competitive loss occurs as result of an elimination of extra contenders in a competition for a limited resource, for example, in a beauty pageant, where the resource is the single crown.

The contest with one winner is the toughest. A softer alternative would be a pageant stopped at the semi-final step: five most beautiful women and ten runner-ups. Naturally, nobody interested in that because of the star culture and commercialization. Commercial advertisement needs a star as a drug addict a shot.

A species or individual loses competition for space to the winner simply because there is not enough space for both. This also happens if there is no resource of energy to supply both contenders even though they are at comparable levels of functional efficiency. Competition runs for both space and time (**Essay 2: On the chronophages or time-eaters**).

Competitive loss is part of the mechanism of the evolutionary loss. Before a biological species loses and exits the wrestling ring, it is guaranteed an access to the fight. In human society and Technos, however, selection happens even before the species or individual even comes to existence because of the dramatic ability of humans to imagine nonexistent things.

The way of a newcomer into existence consists of two stages: the stage of the code and the stage of expression. With the exception of codes that are so garbled that they cannot be expressed, the DNA sequences of organisms must be expressed, i.e., born as organisms before they enter competition. Social, cultural, managerial, and technological projects, and sometimes even children, are first selected at the stage when they exist only as ideas, models, simulations, or just dreams. This gives most mental (and some live children) no chance to be born, especially, when the criteria of selection are of business nature.

A material contender lucky enough to come to existence, for example, a new model of a Thing, can be later eliminated from contest by the winner.

Competitive loss is not necessarily destructive. It simply eliminates data and Things from the focus of attention, which is crucial at the conception stage. Thus, the former presidential candidate who lost the elections, loses most of attention, but he can still try to regain it. Some news are never delivered because of assumed lack of importance or because they are overshadowed by other news. Some data can be moved into deeper layers of the storage, like most books printed ten years ago, not to mention all documents. Information can be retrieved if necessary. The competitive loss is the loss of interest

because new Things and data occupy the limited space and push out earlier ones. As result, topics and items are lost in "comprehensive" handbooks and reviews.

History, by convention, starts with Herodotus. In one of his books, page after page, he describes the Scythians, people living around the Black Sea, their way of life and war, and customs, such as drinking wine from the sculls of their enemies.

Here is the **list of topics** on Scythians in *History* by Herodotus (the Fourth Book, *Melpomene*; the list is taken from *The History of Herodotus*, Chicago: Encyclopaedia Britannica, 1952, p. 339. Series: Great Books of the Western World.)

> **Scythia**, its geography and people; unknown regions beyond; rigor of its winters; rivers in; hemp grown in; population of; measurements of its sea-shore; its boundaries.
>
> **Scythians**, their conquest of Asia; they plunder the temple of Venus; are massacred by the Medes; lords of Upper Asia; overthrow the Medes; their wives intermarry with slaves during the men's absence; their method of obtaining mares' milk, and habit of blinding their slaves; their conflict with the slaves on their return home; account of their origin; Greek legend concerning; they conquer the land of the Cimmerians; Scythian husbandmen; wandering Scythians; the Royal Scythians; they are unconquerable; gods worshipped by; their sacrifices; special rites paid to Mars; their warlike customs; the skulls of their enemies used for drinking-horns; their soothsayers; ceremonies accompanying their oaths; the royal tombs; burial of their kings; ordinary burials; mode of cleaning them selves; their hatred of foreign customs; send to the neighboring tribes for help against Darius; their plan of war; they march to meet Darius; they continue to draw him on through their country, their haughty answer to the message sent by Darius; they assault the Persian camp; their horses alarmed by the braying of asses; send symbolic gifts to Darius; they march to the Ister and advise the Ionians to break the bridge; they miss the Persian army; their marauding expedition as far as the Chersonese; send ambassadors to Sparta; drink wine unmixed with water; their equipment for war; serve under Xerxes.

Herodotus used to be the encyclopedia for the Ancient and Medieval worlds. He is no more one.
For comparison, Columbia Electronic Encyclopedia gives a lot of new knowledge about Scythia in a wider context, but, of course, all Herodotus is gone.

Novels, poems, and stories published in millions of copies are forgotten by the public in thirty or less years and are used only for graduate theses and Ph.D. dissertations. It is not because of the fast changing life—which is fast only because of the incessant race of Things—but because some time ago life settled down to a new large pattern. Books became *models* of the Thing named Book, like the model and make of a car. They are worn out, fall out of fashion, and exchanged for new ones, some times, in a retro style.

I was really struck by two examples of loss.
Bill Joy, cofounder and Chief Scientist of Sun Microsystems, who published an excellent

essay on the future of technology, Why the future doesn't need us. ("Our most powerful 21st-century technologies - robotics, genetic engineering, and nanotech - are threatening to make humans an endangered species.") mentions many names but not Norbert Wiener, the founder of cybernetics, who was the first to warn about a possible conflict between a man and a machine, especially if the machine had a computer inside.

Interestingly, the term *cybernetics* was initially invented by André Ampère, (1775-1836), but was lost, at least to Norbert Wiener.

This is an example of a generation loss: what was hot for one generation is cold history for another. Old ideas are either reinvented or appropriated.

The second example is Allan Bloom's book *The Closing of the American Mind,* a classical work of general importance (**Essay 19, On Reading Across the Lines**), which I discovered only accidentally because of a novel by Saul Bellow (*Ravelstein*) with Allan Bloom as the prototype. Bloom's book was published as recently as in 1987 but it seems forgotten.

In the red hot competitive atmosphere, the contents of national memory are as short living as food on the branch table. Food for thought becomes more and more perishable.

Some Things (tin cans, newspaper), art (TV commercials), and ideas (statements of politicians) are created for a limited life time or a single use. This entire domain of manufacturing, with its fast metabolism, is very efficient in terms of making money, all the more because of the intense recycling.

4. Haystack loss (loss by dilution). Herodotus, Norbert Wiener, and Allan Bloom still can be found in the libraries. The procedure of search, however, is subject to another type of loss, related to the competition loss. It can be formulated as the problem of finding a needle in a haystack and is most typical for modern civilization. It is the phantom loss, not the actual extinction: the object exists but cannot be found. While competitive loss occurs because of the limited space for attention, the haystack loss happens because of the enormous expansion of the search space, caused by increased production of data.

In a very large space it was possible to forget a certain way through it, to lose directions from one point to another, or totally forget how to get to a whole continent. In such a space, an undiscovery was possible. Thus, the medieval art of courtship and chivalry, the ancient Greek art of philosophical discourse, the practice of astrology, and polytheistic religions became desert islands at some time in the past. Some were rediscovered in due time.

The number of other objects of the same category can be so large, that the particular object has a very low probability to be found. This loss concerns large systems. It is usually caused by competition for time: anything can be found, but too slow.

A practical impossibility to process all surveillance data by an intelligence agency is an example of such loss. Thus, a large volume of spy information can be lost with vitally important signals among the waste. Even though the data are stored, the actual loss occurs when it is too late to use them.

Most publishers do not read manuscripts anymore: they rely on agents, credentials of the author, and the endorsements, as well as on the estimated interest in the topic.

This loss seems to be a direct result of the loss of the social stratification and hierarchy typical for all societies, but least of all for liberal democracy. The remedy for it is exactly the hierarchy of subjects, which is used in Internet search engines. It works when one knows the object of search.

I believe that this type of loss was the reason for great changes in philosophy, art, religion, and politics by the end of the nineteenth century.

An individual who could previously find a stable space in guild, cast, class, tribe, is now alone. The barriers seem incomparably higher (not in business, where it is as easy to borrow money as to lose it). The individual can amass social energy by attaching himself to as many names as possible, or to a single weighty one, or by creating a corg (**Essay 33, The Corg**).

The statistical loss accompanies democracy and contributes to its major paradox: all people are equal, but there is no way to give them equal voice. The universally accepted old solution was just to neglect the entire stratum, cast, estate, and race. Today the voices have to be neglected individually, one by one.

Modern expansion and entrenchment of bureaucracy has been a byproduct of computerization. Creating, copying, and compounding documents turned into a simple task, so that the documents became unreadable. Each bill, even at local level, was like Gibbon's history of Rome: a human had no chance to keep it all in head even if it was read from beginning to end. So, paradoxically, the computerization of bureaucracy had little effect on creating order, but introduced actually a lot of chaos.

Bureaucracy means that papers are never read, and even never written, but compounded form standard blocks, with their size and complexity unopposed by any counterforce. Non-implementation of directives was another form of loss.

5. Electronic loss is the back side of computerization. The electronic data require little energy to be either created, or copied, or erased.

Large volumes of digital and analogue data are produced by the current electronic Technos. The volumes of data exceed not only the human capacity of processing them but also the computer capacity, and what is not used is trashed.

Automatic data processing, including classification, understanding, response, and implementation, may stimulate delegating these tasks to Technos. But if the data processing system is faulty, some data are lost completely and absolutely. The easiest way to be lost is go on the Web, which is the most probable fate of these Essays. The survival in the ocean of loss can be achieved by spreading the microweb of links.

Digital code is becoming a universal code of all our knowledge, input from sensors and instruments, and output in the form of commands to people and machines. This is a process comparable with the establishment of the universal genetic code in the beginning of evolution. The significance of this event is that loss is "naturalized:" a certain part of files is expected to be deleted or lost. In the end, we can arrive at a steady state in which the amount of all stored information is kept either constant, or fluctuating, or slowly growing. I believe, we are witnessing this on the Web where there is a certain average life time for a page.

We can only guess what fragments of matter are going to be erased from the face of the earth due to the uncontrollable but perfectly natural—as death—loss of files or because of their offhand management. Having in mind biological evolution, we may expect catastrophic extinctions of information of the same magnitude as those on the record of biological evolution. Electronic wars can inflict enormous damage amount of this loss in an industrial society relying on flow of information.

But can the incineration of a garbage dump be called damage? Information is waiting for a firestorm, as any overgrown forest.

What could we draw from the nonexistentialist inventory?

1. The loss is unavoidable and natural process. We could not have working memory if our brain was unable to forget.

2. Any specific loss can be prevented by applying significant efforts of the same type as in business: advertisement. Mere preservation has little chance to beat production, unless the preserved species can be commercialized.

3. The essence of evolution is a continuous drift of species that enter a larger category and leave it. The same happens at the level of categories: smaller categories drift through larger ones, only very slowly. If we take the category of life, the ratio of plants and animals to humans and the entire distribution of species are changing. If we take the largest category that includes all forms of life and Technos (i.e., of meta-life existing as replication of the code and expression), the distribution of species may be changing there, too.

4. The loss is counteracted by forming a hierarchy of species and individuals instead of free competition and techno-democracy, in other words, by rigging the

competition instead of equal chances. Hereditary monarchy was such a fix in the past, aristocracy later, and elites of influence today.

5. Born out of idealism, preservation is becoming business and industry.

6. Representation of species is becoming a political issue. It was historical limited to humans and products for sale.

7. Human nature has become the largest natural reservoir of stability on earth.

NOTE (2016). Here is an interesting problem. We cannot speak about a loss of anything, for example, loss of courage, ambition, and non-conformism or loss of categories of shame and honor, without numerical data. It is possible to get that from the Web, but it would be of low value without an independent source. The Web is limited memory span. Besides, humans disagree about everything.

APPENDIX

1. **Edward O. Wilson** is a unique figure in modern science for many reasons. His books are a wealth of factual and conceptual knowledge about biodiversity, biological components of human nature, the structure of modern science, and other interesting and important subjects. Together with Jaques Barzun, he is a figure resisting yet another ongoing loss: the loss of depth.

On biodiversity: *Diversity of Life*, W.W.Norton, 1999 and *The Future of Life*, Alfred Knopf, 2002.

2. **Second Law of thermodynamics: different formulations**

Energy spontaneously tends to flow only from being concentrated in one place to becoming diffused and spread out.

Entropy in a closed system can never decrease.

The second law says that the entropy of the **universe** increases.

The Second Law states that in an isolated system any transformation of energy into **heat** is essentially irreversible.

3. Second Law of thermodynamics and open and social systems

ALL ABOUT ENTROPY, THE LAWS OF THERMODYNAMICS, AND ORDER FROM DISORDER: Open systems and production of order.

Frank L. Lambert: Shakespeare and the Second Law.

Douglas R White: Thermodynamic Principles for the Social Sciences

4. Loss of information on the Internet

2002

Essay 35. Crowds and Elites, Bottlenecks and Demons

[elite, power, few and many, law of small numbers, Randall Collins, sociology of philosophers, society of mind, distribution of wealth, power, democracy, elections, Pareto, shark fin distribution, econophysics, sociophysics, sociochemistry]

From poverty to its opposite and back, from the beginning to the end: this Essay continues **Essay 31, On Poverty**, which was its true beginning.

I believe that the topic of distribution of wealth and power, as soon as we start asking simple questions, leads us to the most general understanding of society, similar to the understanding of matter and life in terms of thermodynamics. Moreover, the two understandings can be just one. Power, money, energy of a physical system, psychological stress of an individual or society—all that is actually the measure of the probability of change, applicable to any natural system.

I do not pretend that I have this kind of understanding, but I believe that the major categories we need for it are: **large** and **small**, **many** and **few**, **short** time and **long** time. The generalized energy of complex systems can be measured only relatively, but this should suffice. I don't see any reason why a new term would be needed instead of the familiar energy.

Let us take molecules of gas and people as comparable models. There is a radical difference between molecules in bottle and people in society, in spite of many similarities (both are dynamic systems). We can see the differences with the naked eye, but there is also a radical difference between a very large number of molecules (people) and a small number of them which is not quite so obvious and needs some mental tools to see.

The difference is: the large dynamic system tends to come to the most probable state—it can be equilibrium or steady state—which makes many other imaginable states not just extremely improbable, but outright impossible, while a small system can go through all its imaginable states in any order. Thus, molecules in a bottle of air cannot even for a fleeting moment gather in one half of the bottle. Moreover, they cannot create even a slight difference in the density of molecules between the halves.

On the contrary, ten flies in a bottle can all gather in one half, although not for a long time, unless there is a speck of food, and ten people in a room not only avoid homogenous distribution but can (and like to) gather in groups of two and more, and even all together if there is a tidbit of news to discuss.

This is the same as to say that small systems do not have history: they do not distinguish between the very first and all the subsequent repetitions of the same state.

A small group can be in a moderate number of states. Five people can answer a single question with YES or NO in 2∗2∗2∗2∗2=32 ways: YES, NO, NO, YES, NO; NO, YES, NO, NO, YES, NO , etc. The probability of accidental unanimity is significant: 1/32=0.03125. The probability of a unanimous answer by a group of 1000 people is negligible because the number of possible combinations of answers is astronomical (2^{1000}) and people can have all kinds of ideas, even very weird ones. And nevertheless, millions are ready to vote for Donald Trump because electoral choice is a very small system.

There are very few artificial unrealistic questions that a thousand people can answer unanimously, unless this group is artificially selected, heavily brainwashed, or watched by Big Bad Brother. Examples are: "do you want to die today? do you want to pay less tax? do you want to get a million dollars?" A small group, especially with a leader, can easily work out a single stand on a practical issue, even if there are internal disagreements. It is never a problem if there is a leader with a decisive advantage or the other choice is ridiculous.

A small group is capable not only of mulling over a wide range of pros and contras but also of issuing a decision or answer as if it were one man. A small group works as a single brain, only much better (a single brain can work poorly enough). There are reasons to believe that the power of human minds can be additive and it is possible to create a better mind by hooking several individual minds in a certain way. This is how the theoretical physics of the first half of the twentieth century was made: in small groups of elite scientists and their students. Usually, however, human ambitions produce three opinions for two people.

The system of US elections shows how little the important decisions are entrusted to the large population (and for good reasons). Two candidates are often promoted by small groups in such a way that they are expected to have close chances and cause a maximal division of voters, i.e., into halves close in size. The Bush-Gore elections of 2000 are an example, although the candidates could hardly be more different. Of course, any trace of elitism is a deadly flaw for a candidate's chances.

No party puts forward a hopeless candidate. There are local referendums, but has anybody ever suggested a national referendum on "do you want to pay less tax" or "do you want a million dollars now?" Politics is similar to the principle of trial lawyers: never ask a question if you don't know the answer in advance. And yet Election 2016 starts as a true revolution against established order.

As the large number of molecules is governed by the laws of nature, the large number of people is governed by the laws of human nature. How different both laws are is a separate question. Here I am interested in the difference between the **crowd** and the **elite**, the **large** and the **small**, the **few** and the **many**.

Crowd is a society or its large segment, i.e., a large number of independent but interacting members. All scientists form a crowd: they exchange ideas, knowledge,

praise, and criticism. A crowd of companies interact through business transactions, lobbying, advertisement, competition, and partnership. Investors in stock market form a different crowd: they lose and gain, gambling for a fluctuating resource. Members of competing crowds interact through cooperation and struggle. What is important about the crowd, it is its large size, so that most of its parameters have a meaningful statistics and the crowd can be described not through a list of its members and their properties but through statistical distributions and parameters.

Crowd is an example of a system. System, however, is a more abstract concept, Systems can be small, built of dependent parts, of mostly identical entities, etc. Crowd is a large human system built of interacting individuals or groups. All of them are different even if they want to be like the other guy.

A member of a crowd tries to maximize a certain value, for example, limelight, wealth, prestige, power, authority, and influence. The higher the value, **the easier** to increase it. At the same time, because the total value of a crowd in the short run is approximately the same, the more one member gets, the less the others have. This is why the higher the value, **the more difficult** to increase it, but for different reasons.

I will call the value **resource**. It is something that can be transferred, shared, multiplied, or destroyed in the interactions between the members of the crowd, so that the total cumulative resource is approximately constant and changes slowly.

Examples of a catastrophic change of resource: severe drought, sharp depression, war and embargo, sharp change of oil prices, stock bubble.

It is the main axiom of classical capitalist economics of Adam Smith that every human wants to maximize wealth. Kenneth Galbraith noted that power, too, must to be in the picture, although it is not a classical economic notion. According to my observations, the generalization about the universality of the will to wealth and power does not seem obvious. There are two main reasons for that.

First, what all people want (with very small exception) is happiness. It was noted by the ancient Greeks long before not only capitalism, but even feudalism. It may take various forms, including stability, attention of others, altruistic service, pursuing a goal, leisure, even sloth. The desire of wealth and power belongs to independent properties of individuals. The intensity of my desire for wealth and power is by no means influenced by other people's desires and *vice versa*.

The fact is that people vary very widely in what they want and how much they want it. For immigrants from poor or devastated by war countries the desires may be limited by stability and peace, which are not economic values at all. Many who go to the academe do so for the sake of stability, among other reasons. Some others do it for the love of the profession. Some people need respect and praise as much as others need wealth and power and one set does not guarantee the other.

Moreover, even from the theoretical standpoint, in a statistical crowd, any independent property must be distributed more or less symmetrically along a bell curve, with a few having a high value of this property (height, strength, ambition, drive for wealth, drive for power, imagination, etc.). Whether we are tall or short, it has no influence whatsoever on the height of other unrelated to us people. Whether we are rich or poor, it has an influence on the well-being of other people, if we assume that the total amount of wealth is approximately constant.

I use the vague but popular term "bell curve" because it is the general shape of distribution that matters most, regardless of its mathematical form. There are two extreme cases: symmetrical (bell curve) and strongly shifted (shark fin) distributions, compared in **Figure 1.**

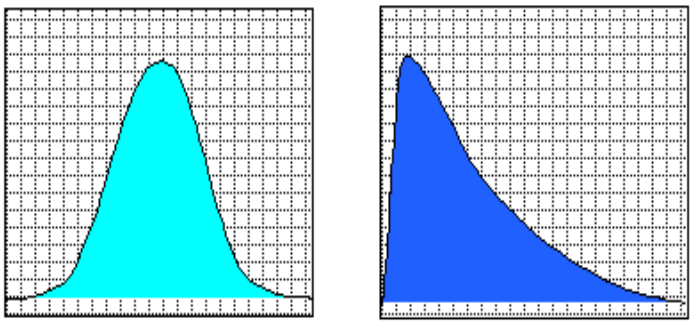


Figure 1. Bell curve and shark fin distributions

The shark fin shape appears when the members of the crowd depend on each other in their personal values, which is possible in the case of competition for a resource.

Elite is a smaller part of the crowd, with the highest cumulative amount of the resource. **Elite** represents the higher (right) end of the shark fin distribution (see **Essay 31. On Poverty**). The high (right) wing of the bell curve is also an elite, it may be the highest IQ intellectual elite, but neither political nor the financial one because people do not depend on other unrelated people in their IQ and there is no limit on total IQ. Physical strength, height, IQ, and inborn melancholy are intensive values while wealth and power are extensive values. By elite I mean here only the "extensive" elite.

Energy is a measure of the ability of a system to change. High energy means instability, i.e., high probability of change. Life—biological or social—happens only in open systems where a certain order can be maintained only by a supply of physical energy. Energy (known in physics as **free energy**, see **Essay 7, On the Smell of Money**) has two components: physical energy and internal order. The difference between the two tells how much work could be done by this energy.

Social synonyms of energy, however, are a very poorly researched subject. Social thermodynamics (part of it is emerging as econophysics and sociophysics), together with social psychology and sociology, might contribute to our understanding of social and individual energy. The problem with physics, however, is that it is not accustomed to dealing with structures of high and irreducible complexity which cannot be shrunk to a few equations. This might be the subject of sociochemistry, however.

To illustrate the problems with energy, here are some examples of arising questions:

1. What happens during the transfer of knowledge? A scientist of a lower rank may increase both the status of a higher rank scientist who uses the knowledge of the former, and his/her own status. What is lost? What is preserved?

GUESS: No loss. Knowledge is growing and is very far from being a conservative resource. A steady state is theoretically possible, at least, imaginable. The prestige of the low rank scientist slowly accumulates, while the high rank scientist who refers to the other creates a possible competitor.

2. Money in a crowd can be regarded as energy (**Essay 31**, appendix). Is a transferred quantity of money really preserved or part of it is dissipated? Or the transfer creates value, as in a loan or investment?

GUESS: The entire modern economic system is a device to dissipate the energy of mineral and other fuel. While the fuel lasts, economy is still growing and money is being created at transactions. A steady state is possible, but it is not in sight, yet.

3. What is the difference between voluntary competition (or exchange of knowledge), and forced one, as in a chess championship where a master has to prove his title?

GUESS: Fame, like in cases of champion status or beauty crown, is the most conservative resource. If it still expands, it is because advertisement and media industries need stars as raw material for growth. A star is a vehicle for money-making. Exchange of fame is still unhindered. Exchange of knowledge is one of the most restricted transactions in industry and increasingly in academia because of patent law.

Entropy is a measure of disorder in the crowd: the higher entropy, the lower order, the higher chaos. Energy can be used to increase order, which is possible in natural or man-made machines such as organisms and pop stars. Order means that there are rules of interaction and some changes are facing strong opposition, while others are alleviated.

Temperature is the price of a unit of energy in terms of order it can create. In other words, it is the conversion rate between energy and order. A different view—compatible with the first one—is that the temperature of the crowd is the average value of the resource. Example: gold fever.

The factor of an underestimated importance is time. History consists of events and processes in time. **Bottleneck** is the slowest stage of a multistage process. It is also known as the **weakest link**: the location of most probable change. They both are **limiting factors.**

Demon is part of the system that increases the order in spite of the general tendency to disorder. Demon can work very efficiently if it sits at the bottleneck. Bureaucracy, government, and corruption create bottlenecks and assign demons to collect toll for a passage. Government agencies are demons, not in any derogatory sense, but... mafia is also a demon. See **APPENDIX 2**.

Star is the winner in contest for attention and recognition. Everything linked to a star is supposed to attract attention, too. The star is a temporary member of star elite, which is very fluid. The star for a snickers company is like gold rush for a spade trader.

What is political **power**, then? Power in society is a very tricky phenomenon. It is easy to tell what it is not: it is not the ability to maintain order, i.e., keep entropy low by using energy, usually, in monetary form. Same low entropy corresponds to different arrangements of society. Equal powers can be used to maintain incompatible orders. Loose autocracy and inefficient democracy may keep the same entropy of society. A person who has great corporate power may be powerless in his own family.

Power is a social mechanism of applying energy (in the form of money, of course) for creating a particular order against another power that applies energy for creating a different order. Political power is not just money or any other resource. Like the power station, transformer, power line, local transformer, and electrical outlets in a neighborhood, or like the engine, transmission, steering, and wheels of a car, power is a device that performs a certain function and maintains a certain structure of order by consuming energy, dissipating part of it, and transforming the rest into order. Social power is never universal, neither it is abstract.

This is why political power can be bought. It is a kind of a Thing: a machine, an organization, and even an organism, like horses in agriculture or elephants in the army of Hannibal. The one who buys a power device must also buy fuel every day. Power feeds on money.

Power is a mechanism, an engine: it needs to be designed, built, painted in cheerful colors, oiled, maintained, served by specialists, supplied with energy, and used. This is why not just government or a big corporation can have power. In capitalist democracy, everybody who has money or can raise funds can buy components and build a mechanism of power, possibly, as a little corg (**Essay 33, The Corg**). This is exactly why the corg is possible: it is a gadget manufacturing a certain increment of a general political order. For the elephants of power, voluntary contributions are a very inefficient way to graze.

Corgs of a very limited scope are already built into large corporations, as Kenneth Galbraith noted, but what I personally see is the evolutionary divergence of the corporate host and its internal symbiont. The loose anti-globalization movement and global terrorism are both examples of yet imperfect corgs that are free of material production. They have a corporate nature and are completely focused on social and political change. Note that in modern world destruction is the cheapest activity: it goes on even if you don't move a finger (See **Essay 34, On Loss**).

The Russian Bolsheviks, who built the party machine, overturned the social order in 1917, and kept refining the new order, were the evolutionary predecessors of modern corgs. Interestingly, the Bolsheviks created also a giant national manufacturing

conglomerate, but destroyed all its competitors up to the last man. The external competitors, however, toppled the classical black-leather-jacket Bolshevik in the 60's.

Kenneth Galbraith believes in the spirit of team work and genuine dedication and pride of the employees of a large corporation. I am less idealistic, and although team enthusiasm cannot be denied, it is the material reward (or fear of punishment, as in Soviet Russia) that keeps it burning. The Bolsheviks maintained the team enthusiasm by telling the people that they worked if not for themselves then for their children who would be in worker's paradise. Remarkably, the terrorists, too, promise paradise, as well as justice on earth.

Whatever subject of these Essays we touch upon, it points to enormous amount of available literature. Art, entropy, poverty, energy, liberalism, competition, Technos… thousands of books, papers, and web pages. Does it make sense to squeeze a droplet out of each giant fruit of knowledge, all the more, if this droplet can evaporate right before our eyes?

It is exactly the tiny size of the droplet that makes sense. Only a small volume of knowledge, like an ancient saying or a modern aphorism, can be applied to large multitude of situations.

I do not believe in utilitarian benefits of general knowledge, small in volume, portable, and as applicable to any problem as a lock-pick. I believe in the benefits of detailed, profound, and professional knowledge, which cannot be found in one person and is distributed among specialists. My Essays are not a source of this kind of professional knowledge. It is a source of some questions and answers. The answers can be disputed and changed for better ones: they are just seeds of professional answers. The questions point to the places where to plant them. The Essays belong neither to sciences, nor to humanities, but, as I hope, to a narrow tidal strip between them where the waves of humanities wet the dry sand of sciences, rolling back and forth.

As I believe in art, I believe in esthetic qualities of general knowledge.

If poetry and art have any function, it is to obscure the essence of human nature, to complicate and embellish it (sometimes with dirt), and to turn into mystery. This is what poet does in the most intimate poetry. Art makes life look more complex than life really is. If one asked why the modern art makes an opposite impression, I would say that modern art is not about life: it is about art. Similarly, abstract knowledge, which is concerned with the most general properties of the world, is not about the world: it is about knowledge. There is even a disturbing similarity between modern art and abstract knowledge: they both are reducible to a small number of principles and they both dehumanize our view of the world by rejecting its anthropocentric design.

> **NOTE** (2016). To be objective, whatever that means, science should not depend on properties of humans . Individual humans are not present in equations, other than in their authorship. But science is free to ask any question. The question on my mind

> is: then how can the science (real science) of human matters be possible? The answer is: by using patterns instead of equations.

Looking back at my life, I see that nothing, except my family, enriched my life as much as my interest in understanding the world around me, whether it was the science of chemistry, which was the source of my income, or completely useless knowledge about things with no relation to my life, like the cuneiform dream books of ancient Babylonians.

Do I understand what I am writing about?

The process of understanding is like listening to music or reading a novel: it captures my attention and gives a kind of satisfaction which no physical pleasure can give. Like art, it takes me to a different world. Probably, it is not such a big paradox because knowledge consists of ideas, and ideas are certainly nothing we can feel with our senses. Understanding is the most refined of all human pleasures: you acquire the ability to touch and feel ideas as if they were pebbles on the beach. It does not last, and if you once enjoyed understanding, you want it again and again. Even wrong understanding is a treasure: it can be exchanged for a better one.

The ancient advice "know thyself," which Socrates heard from the Oracle of Delphi, does not seem as enlightening as "know the nature of things." While Thales of Miletus said that to "understand thyself" is extremely difficult, Albert Einstein was optimistic about understanding the world. "The most incomprehensible thing about our universe is that it is comprehensible" is ascribed to him, although I was unable to find the reference.

I see the subject differently: it is extremely hard to understand the world, but easy to understand myself, even if it is difficult to accept the unflattering self-understanding. This is why self-knowledge is discouraging while exploration of the world is a source of unending joy. As soon as we know ourselves, life ends because nothing can add to it. We lose the mystery of our existence and become predictable, though unreliable, cogs in the mechanism of the world, even if we do not know how the mechanism works.

The world is enormous in size and complexity. Why can we understand it? There are several reasons, but all of them have the same pattern: we represent a **large** number of objects by a **small** number of ideas. As Henry Poincare said, mathematics names many things with one name, and the same is true about physics and any science.

We operate with ideas, and ideas, like modeling clay, fuse together into a small number of large pieces which are also ideas. Unlike clay, however, all ideas, regardless of generality, have the same size and weight because they are immaterial. This is what makes them so different from the pebbles: one cannot find two identical material objects, unless they are stamped out by some machine, which is also a realization of some idea.

> **NOTE**: Having said that, I suddenly realize the origin of the idea of equality: it regards human beings as ideas. Or, to put it differently, it is an **idealized** picture of the real world.

There is a natural limit to a volume of knowledge a single average specialist can manage. The size of this area is, probably, defined not just by the mental capacity of an individual, but by a limited number of intellectual leaders in the area—a property noticed by **Randall Collins** in his marvelous and radical *Sociology of Philosophies A Global Theory of Intellectual Change* (Cambridge, Mass.: Belknap Press, 1995). I would like to retell his vision in somewhat different terms because, among others reasons, this is a fascinating **picture of an elite**, in this case, the elite of philosophers: self-proclaimed elite of elites.

There is an intellectual space, which can be compared with an area of land populated by packs of sophisticated animals who, believe it or not, graze mostly on grass, and only occasionally kill and eat devour each other. The packs (sounds more appropriate than "herds") have a certain hierarchy, with dominant males as leaders.

My biological interpretation of Collins' ideas is strongly influenced by his own eloquent imagery:

> Imagine a large number of people spread out across an open plain—something like a landscape by Salvador Dali or Giorgio de Chirico. Each one is shouting, "Listen to me!" This is the intellectual attention space (p. 38). [See **APPENDIX 2**]
>
> The tribe of attention seekers, once scattered across the plain, is changed into a few knots of argument. The law of small numbers says that the number of these successful knots is always about three to six. The attention space is limited; once a few arguments have partitioned the crowds, attention is withdrawn from those who would start yet another knot of argument (p.38).

I substitute animals for people in order to emphasize the competitive and compulsive nature of interaction.

There is a certain limit of density of intellectual animals on feeding grounds. If it is exceeded, the extra males have to leave the pack. Conversely, if the number of animals too low, they cannot breed. Thus, Collins establishes the number of coexisting and competing intellectual families (or packs; schools, to be exact) in the area as three to six. This is his law of small numbers, which can be interpreted as the power of an elite.

Collins' picture is much larger and richer than that: he describes the networks of intellectual relationships between different schools and rituals of the interaction between individuals. I would say that an intellectual needs to mate with other intellectuals, and there are as many sexes as there are intellectuals. In the fight for a mate, instead of joining the leader and waiting for an opportunity, one might either become hostile to other seekers. One projection of the entire multidimensional picture gives a

shadowy impression of biological struggle for existence on a limited resource. Naturally, it leads to evolution.

This seems to be a very realistic picture for philosophy and humanities in general, where fashion plays a certain role, limiting the number of "designers," but natural sciences avoid overpopulation by splitting and self-fragmenting into specialized area, as it happened with chemistry, sociology, and anything else. Conflicting "schools" is a rare phenomenon in modern experimental sciences but can be seen at the level of hypotheses. Thus, the area of biological evolution, which cannot be observed in all detail and can be subjected only to a very limited experiment, consists of schools of thoughts, and even creationists try to be one.

The sociology of philosophers along Randall Collins seems to differ little from the sociology of politicians. Modern natural sciences, in an extraordinary fashion, are moving closer and closer to politics and philosophy, at least in America, because science today is a competition for limited resources of money and attention. The scientists, too, attract money either by demonstrating their traditionalism and loyalty to proven leaders, or by splitting off new branches and brandishing the novelty and revolutionary promises of their research.

The result of the fragmentation of science is that not only most scientists lose the general view of the world, but they lose any interest in such a view. All they want is to breed, compete for dominance, and stop slightly above their level of incompetence, and this is perfectly normal today.

Pareto's distribution (Essay 31, *On Poverty*) applies to production of knowledge as much as it applies to production of wealth: a few leading intellectuals (dominant "males;" some of them females) produce a vast majority of publications—a well-researched fact . It is among a few leading thinkers that the larger picture of the world can be found, and Ilya Prigogine, Ulf Grenander, Randall Collins, Edward O. Wilson, and, probably, Neill Ferguson are those I would think about among my contemporaries.

I believe there are two reasons why the larger world can be understood:

1. Because it can be split into **small** areas which can be seen in all details. Their modest complexity is quite easily manageable by postgraduates because standard elements and relations between them are identified in larger areas. The interests of most intellectuals, whose function is teaching and generation of published ideas, are limited by a small list of topics, as anybody can see in the listings of department faculties.

2. Because only a **small** volume of knowledge applies to all its small areas. Hierarchy of intellectuals, leaders, knowledge, wealth, and power, as well as hierarchy of abstract principles descending down the scale toward the ground is the reality. The principles, however, range from completely untestable, as religion and philosophy (all religions and philosophies are equally true and false) to those experimentally testable before the jury of peers.

Therefore, an intellectual needs a small volume of general abstract knowledge applied to a small area of research. Very general and abstract principles, however, are difficult to interpret. We can see big disputes—burnt out as well as ongoing—about such fundamental things as information, entropy, life, and evolution.

My thesis in this Essay is the universal importance of the opposition between **large** and **small**. It is definitely inspired by the Randall Collins' law of small numbers Not only the volume of all knowledge is large and that of most important general principles is small, but also the power of small number of people vastly surpasses the power of large masses. Power, knowledge, and wealth are productive only when they are concentrated. This is why this world can be not only understood but also managed by creating a hierarchy of concentration with either elite or a single sovereign at the top.

But what about the will of the people and democracy? To express and execute their will, the people elect the government. What self-respecting freedom-loving people would form a such a giant mechanism for the function that could be performed by a small elite?

Da capo al fine.

hat is democracy, then? It legitimizes the fight for dominant position. It establishes the Pareto distribution of wealth and influence. It typically (with some exceptions) gives people as much power as they have wealth. Do the people decide? No. A crowd cannot decide anything because decisions can be made only in small groups. A crowd can select between presented options and every vote is already largely ordered by the presentation of options and has only a limited random component in it. "It is not that anything's wrong with it" (Seinfeld). It is natural. But it is not what many people think: it is not about equality.

Absolute equality is absolute zero of social temperature.

Fine.

APPENDIX:

1. Sociophysics.

Arnopoulos, P. (1993). *Sociophysics: A General Theory of Natural and Cultural Systems* (Nova Science Publishers)

"Sociophysics is constructed within the conceptual framework of a Systems Unification Model which bases the political, economic, and cultural sectors of human society upon the physical, chemical and biological aspects of nature."

I could not find it in the libraries and, unfortunately, it costs over $100. I am not a good example to illustrate the theories of Adam Smith.

2. Pandemonium.

Metaphorically we can think of a set of workers, all looking at the same blackboard: each is able to read everything that is on it, and to judge when he has something worthwhile to add to it. This conception is just that of Selfridge Pandemonium ([Oliver] Selfridge, 1959): a set of demons, each independently looking at the total situation and shrieking in proportion to what they see that fits their natures (Allen Newell, 1962).

Quoted from *The Handbook of Artificial Intelligence*, Volume IV, p. 18. Avron Barr, Paul R. Cohen, and Edward A. Feigenbaum, Editors. Addison-Wesley, 1989.

Also, on Pandemonium and other topics: Mark Humphrys' site. I see in it a general concept of sociology of mind, from which I conclude that the society of philosophers is, actually, a collective mind, working as the single mind in Artificial Intelligence (AI).

A good recent book on AI: Stan Franklin, *Artificial Minds*, Cambridge, MA: MIT Press, 1995. That one I bought and did not regret.

3. Statistics as the study of crowds

There are **objects** and there are their measurable **properties**. Any such **property** is **ordered**: for any two values we can say which is larger. Time, energy, position, and other physical variables are naturally ordered: one variable is larger than other. So are IQ, wealth, creative productivity, sports achievements, etc. Physics expresses the dependence of one variable on another in the form of mathematical function.

Some human properties, for example, ethical ones, cannot be exactly measured, but there are other ways, see **Essay 13, On Numbers**.

Objects cannot be ordered. All we can say about them is that one is not the other. People, animals, plants, seeds, words, events, molecules, etc., and, actually all **objects,** not their properties, do not have numbers on their backs. If they have, they can be numbered in any order: the number is just a name tag, as on the back of a football layer. This is what crowd is by definition. Mathematics cannot arrange a crowd in line, unless by some **property**. Statistics looks at their measurable **properties** *per se* and tries to find out how a property is distributed over the crowd of **objects**. It analyzes the connection between the value of a property and the number of members of the crowd that have it. Clearly, statistics cannot say anything about a particular objects, except in terms of probabilities. One needs very special skills to use the fruits of such apparently idle occupation, but the results could be powerful. Still, using probability theory, born from the card games, for personal goals may be as much a winning as a losing business. Mathematics of crowds works better for crowds themselves.

2002

Essay 36. On Fatalism

[Lao Tzu, Goethe, Faust, how-to books, fate]

In **Essay 33, The Corg**, I said that my attitude toward history was fatalistic. Whatever my attitude is, history does not care. It is my own life that depends on my attitude to it. But does it?

The power of idea, like the power of hurricane and earthquake, has manifested countless times throughout history.

What is idea, after all? We have a word for it—***idea***—but is it anything tangible, measurable, and empirically detectable? What is fate, for example? I have mentioned it many times in the previous Essays. Does the word signify anything, and if so, can we change our fate?

Such confusing ideas as equality, justice, democracy, and truth have been causing endless arguments turning into fights and upheavals. If instead we use terms *inequality*, *laws of the land*, *system of government*, and *opinion*, the arguments subside because what the second set of ideas signifies is definable and demonstrable. Inequality is measurable (**Essay 31, On Poverty**), the laws (often ambiguous) of the land are listed, the system of government (often paralyzed) can be explored in action, and an opinion can be tested and compared with other opinions and facts.

There is a great inequality between ideas. Some ideas are deemed false. Some are concepts and abstractions that people can easily agree on. Others are sacred by definition. Genealogy of ideas can be traced. They are used productively by professionals and can generate progeny of other ideas. Others, in use by prophets and commoners, seem to be an eternal source of squabble and perplexity. There is a simple reason for that: any large numbers of objects—whether peas or people—always deviate from the average. Evidently, no large and free community can come to complete agreement on anything, except within narrow congregations, cliques, and circles. Professional terms are defined for narrow layers of professionals and this is why some ideas of a narrow usage work fine.

From the positivist standpoint, which demands a proof for everything, fate should be rejected. However, considering how much such illegitimate idea as *fate* influenced the fate (see, we just can't do without this word) of many people, we at least have to linger a little before throwing it out.

Is fate just a synonym of current or future reality? It was, in Greek mythology, where three Moiras (Parcas in Rome) divided the labor of spinning the thread of human life, assigning content to it, and cutting in due time. The handcraft metaphor clearly confirms that the initial idea of fate had been the same as life itself and the divergence happened later, when people started asking questions about the entire technology of existence and whether some profit could be made on improving it. Manuals are still in demand, see **Appendix 1**.

Greek tragedy, for example, *Oedipus Rex* by Sophocles, presents a more rational than esoteric form of fatalism. The tragedy, as the myth itself, has meaning because the plan, revealed by an oracle, comes from credible authors: gods. The actual events can be compared with the plan, like a theoretical prediction with a scientific experiment. To rationalize fate, it turns out, we have to believe in gods. Fatalism seems to have meaning only in context of a larger doctrine and this may be true about any other esoteric belief. Not accidentally, fate is often discussed in connection with religion or Marxism, i.e., when there is very little room left to discussion. Otherwise (environment, human race, European Union) it simply means the future.

The Greeks, it seems to me, developed a metaphoric understanding of human nature and environment, which was an evidence of knowledge in the state of spit between art and science. Metaphor alone could not satisfy human mind, curious and restless, which tried to look at the hidden side of things, to see how they were attached to each other, what was inside, and name everything there by different words. After Aristotle, metaphor went with poetry that maintained the view of the world as a whole. Science took the things under a magnifying glass, one by one, isolated, with endless skepticism, ignoring the rest of the world and leaving no room for metaphor. It is a purpose of all these Essays to analyze how and why the neo-metaphoric view of the world makes sense.

The numerous residents of ancient Pantheon represented major types of personality and patterns of human behavior. That was, probably, a common trait of all polytheist religions consisting not of rules and commandments, but of examples, exceptions, and illustrations. The intricate pantheons of Maya and Aztec mythologies look like first encyclopedias comprising all important aspects of human existence.

After the colorful and comfortable (probably, more so for Greeks than for Aztecs and Maya) diversity of paganism, the monotheistic religions put human mind under a severe stress out of which the quest for secular understanding was born, with its unstoppable division into sciences and narrow fields. In the cultural marketplace, a postmodern *Poptheon* has been erected in place of the Pantheon of artists and writers of pre-computer era. Monotheism, like any monopoly, is something any hedonist secretly loathes. Really, one God leaves you no alternative! It smells of fate and fate smells of death.

If fatalism is a belief in an existence of some plan, design, and general course of life which is impossible to change, then fate may have an interpretation other than a mystical power or the will of gods. It could be simply genetically predetermined component of personality, acquired but ossified habits and patterns of behavior, impenetrable social

walls, and even the laws of thermodynamics, sometimes taking form of Murphy's Laws. With such understanding, we do not need any observations of the actual course of events because the laws of nature work **always**. The snag, however, is in the "**always**."

Not only all the most general laws of nature are thin on specifics, but, more important, they never deterministically include the variable of time. The fact of limited duration of individual life—death, to put it bluntly—is the major inspiration of arts and philosophy, whether we fear or deny our absolute end. It is a mystery exactly because of the uncertainty of timing. "Always" is only a figure of speech as far as any individual life is concerned. To say that a law of nature is timeless is to say that it is probabilistic. We can die any moment, but more probable later than right now.

We call the events that will **never** happen **impossible** . There are no specific laws of nature, however, concerning how soon **possible** events do happen. If we take chemistry, for example, where the question of time is crucial, the prediction is based on a combination of timeless laws of nature, i.e., thermodynamics, and practical observations that can be trivialized as: if the circumstances are favorable, it happens sooner, and if not, it happens later. In other words, it is better to sell umbrellas on a rainy day than to sell sand in a sand desert. Similarly, in everyday life, if we know a probability of a certain event, we can in many cases tell if a somewhat different event is more probable or less probable.

Therefore, we can change our fate, within some limits, by studying technical books of the kind listed in **Appendix 1**. But can we change our desires that guide the selection of techniques? Our fate is what we really want and if our abilities and character do not fit our desires, we can hardly realize our dreams, especially, the wildest ones. Buddhism and Taoism both offer a working solution: give up your desires. If anything can insure a long life of any religion, it is the difficulty to follow all its commandments.

My personal time scale is limited. What about historical one? On the historical scale, there is a large, almost infinite, resource of time. It is being eaten out (see **Essay 2**), but is supplied fresh every morning, anyway, although always in the same strictly measured quantity.

There is a certain similarity between an individual and society. On a larger scale, there is a form of historical fatalism called historicism.

> Historicism, which is closely associated with holism, is the belief that history develops inexorably and necessarily according to certain principles or rules towards a determinate end (as for example in the dialectic of Hegel, which was adopted and implemented by Marx). (Steven Thornton).

If a person moves toward a definite end, according to inexorable laws of nature, so may large collections of persons known as societies. Individual civilizations and cultures are definitely as mortal as any human being and as capable of self-perpetuation and breeding. It is difficult to deny that any positive knowledge has a flavor of fatalism: whatever your intent, the things will run according to the laws of nature. The controversy arises when

fatalism clashes with its twin brother Free Will. The difference between both is not as radical as one can imagine: fatalism is a Big Brother's (or Big Father's) free will.

The observation that people and nations seem to be cast into different molds raised the question: can we change our molds? The entire continuous spectrum of answers has been generated with time. The problem of fatalism would be of no interest if we were fatalistic about it. In fact, all we care about is how we can control our life. How to make a million overnight? How to preserve youth and beauty? How to cure cancer? How to have it all? These down-to-earth questions are quite different of those posed by existentialism (see **Essay 27, The Existential Sisyphus**).

Existential questions are always individual. The problem I am seriously interested in is the historical fatalism: when we see that society, from our point of view, takes a wrong, dangerous, or simply boring course, should we resist it in our hearts or accept the change? The future generations will find the result as *fait accompli*, anyway, and will learn about the change only from history and not from their own experience. For them, "wrong" and "dangerous" will have a different meaning. Does it make sense to resist the historical fate instead of surrendering one's will to some powerful collective forces that would not ask for consent later? But this is a different topic. Here I am looking at my own life.

I considered myself a fatalist since my youth. I don't think I clearly understood what fatalism was, however. My life lay ahead, unknown and untested.

I have never been a fatalist in the sense that I believed in a certain plan of events that could not be changed. Whatever we do or do not and whatever happens afterwards, there is no way to know whether it was anticipated by any plan unless we know the plan itself. The true fatalist, probably, believes that it does not matter whether we know the plan or not because the actual unfolding of life is always identical with the plan, but a skeptic like myself can rely only on a reasonable evidence.

Neither a practicing nor a secular fatalist, I still feel drawn toward the concept of fate—like many generations before me. If science has no qualms discussing the fate of the universe or humankind, why should I? The scientific approach to fate also presumes the existence of some plan, not signed and sealed at some otherworld office, but revealed to a curious and diligent observer.

I may have a fate of a kind, after all. In terms of evolutionary drawers (**Essay 32, The Split**), fate may mean simply a larger drawer which I under no conditions can leave. I am able, nevertheless, to move between a few smaller dwellings of my own will. The concept of fate as a set of limiting principles—i.e., establishing impossibility of something—looks quite respectable for a scientist. It is our fate never to make eternal motion, for example. This is very far from the common concept of fate, however. Fate must say, yes, this is what is going to happen. Oracles cannot predict what is not going to

happen. And so the oracle of Delphi tells Croeusus, king of Lydia, that if he attacks the Persians, he will destroy a mighty empire. And in fact, he did: he lost his own kingdom. The treacherous prophesy was, probably, prompted by a plethora of precious gifts that Croesus had sent to the oracle before asking his advice.

In my youth at least three oracles predicted that I would end up badly, which, in terms of limiting principles, meant not to end up well. I was about twelve years old when a hairdresser said that my tough hair was a sign of bad temper and I would have problems. The other was the dean of the college faculty (I was in my twenties) who said essentially the same when I had tried to seek justice on behalf of another student. Much later, disturbed by my listening to BBC in English on short-wave radio, my father was more specific, predicting that I would get into prison. All three had an ample experience with hair, students, and Soviet system, respectively.

Outside Russia, fatalism is exemplified by Russian roulette. I read about a version of it very early, in *The Fatalist*, the last chapter in a short novel entitled *A Hero of our Time* by Mikhail Lermontov. How early? My grandmother had given me the book when I was about five years old and could understand only pictures. One of the first books I ever read, it was with me through all my school years. For half of those years I could not fully understand it, however.

Pechorin, the "Hero of our Time," was an extreme individualist. Since individualism was anathema in Soviet Russia, the term "redundant man" (out of place, useless) was instead applied in school textbooks . The novel, extraordinarily innovative for 1840, is available online in English and is much worth reading. The main character of *The Fatalist* suggests the test and runs it:

> "Gentlemen, why this idle argument [about fate]? You wish for proof: I propose we test it out on ourselves whether a man can do what he wants with his own life, or whether the fateful moment has been preordained for each of us . . . Who wants to try?"

The composition, laconic style, and sense of doom in the book still seem modern. Next year after the publication, at the age of 27, Lermontov, one of the most gifted writers Russia ever knew, was killed on a duel.

When I was leaving Russia for good, after a decade of being in a limbo, Lermontov's words sounded in my ears:

Прощай, немытая Россия,	Good-bye, dirty Russia,
Страна рабов, страна господ,	The land of slaves, the land of masters,
И вы, мундиры голубые,	And you, the blue uniforms [of policemen,]
И ты, им преданный народ.	And you, their devoted people.

Writing this Essay, I begin to understand that I was infected with virulent individualism, probably, at the age of six, when I learned to read. I could not inherit it: none of my

relatives displayed it at any substantial degree. But why fatalism? Individualist believes that his fate does not depend on other people.

I understood fatalism—when I was able to understand it my way—not as the acceptance of the general course of life (I can always find reasons to protest) but as a belief that any tangled, stressed, and confusing situation will be resolved on its own, as I understood much later, simply because the stress cannot last by the laws of thermodynamics. It is always temporary by definition. The solution—not the causes of the situation—should be accepted because it would always be for the better. It is the stressed and confusing situation which is bad, exhausting, dangerous, and warning of tragedy. However "better," it is a pessimistic view.

The best known literary proponent of paranoid optimism was Pangloss, a character of Voltaire's *Candide,* who believed that everything happened for the best in this best of worlds.

> "Well, my dear Pangloss," said Candide, "when you were hanged, dissected, severely beaten, and tugging at the oar in the galley, did you always think that things in this world were all for the best?" "I am still as I always have been, of my first opinion," answered Pangloss; "for as I am a philosopher, it would be inconsistent with my character to contradict myself;..." *Candide,* Chapter XXVIII.

That kind of belief was certainly possible only if supported by a doctrine, without which there is no philosopher.

If such a doctrine existed for my early optimism, it would incorporate the idea of Goethe about happiness. It is the state out of which no movement seems to have any attraction and in which we want time to stop. From the point of view of science, this may look like a thermodynamic minimum, i.e., the state of the lowest energy from which there is no spontaneous exit. It is a marble at the bottom of a wok. It is the opposite of stress, but it does not last, either, in life and history, by the same reasons as stress. Life and society are evolving complex open systems.

The marble reaches its happy state on its own. The non-equilibrium world of human existence, however, is not the same as the world of marbles and utensils. It is more like the world of Lewis Carroll where you have to run in order to stay on the spot. The picture, at least in the Western tradition of active life, should be turned upside down.

In the actual thermodynamics of happiness along Goethe, the way to happiness is arduous. It is like climbing a mountain until, at the very top, there is no more mountain to climb. Naturally, one can live on the top of a mountain but for a short time. A blast of wind can knock one off the bliss. In practice, a creative personality has to explore the entire landscape to make the bliss recurrent.

For the Greeks, happiness had no metaphor: it was one of primary and self-evident categories, without the backside, and a measure of other things. Goethe, who lived one hundred years after Newton and Leibniz, in the world where the divergence between art

and science had already happened, was looking for complexity of simple things. In his pursuit of individual freedom, combined with elitist mentality, he saw happiness as non-competitive leadership. It was the happiness of the settler on the open frontier. It was the happiness of the winning army general and successful CEO. The opposite idea of happiness has been that of Taoist non-action (wu wei), i.e., following the natural course of things. The difference between both was like to have and to have not, but a healthy philosophy should better include both.

I believe now that our personal fate depends on the position of our character on the scale between Faust before the devil comes to help him and Faust at the end of his life. I never wanted to command or judge people, and I certainly had something of a Taoist type, although it came to me not from Chinese philosophy but from Dhammapada, an important book of my youth. A combination of Taoist and Faustian genes, like a love-hate relationship, cannot make anybody happy. Life becomes a constant search for a more comfortable position on a steep slope. I suspect that extreme individualism has a backside: do not touch me and I will not touch you. This makes either active or passive life equally difficult.

Whether we are closer to a CEO or a Taoist hermit, our actual life will be strongly determined not only by our socio-genetic makeup, but also by how many other potential emperors and hermits are nearby, see **Essay 35, Crowds and Elites, Bottlenecks and Demons**. Life is very much different in highly active and competitive societies, as compared with the saturated and sleepy ones.

I am about to say something truly sacrilegious.

I have an impression that the individualistic nature of the modern American society is greatly exaggerated. It has become a myth. When people are admitted to an open and honest contest, they enter it alone. But in a society of big numbers and mass production, the impossibility of direct democratic contest in a sufficiently small circle of people, who can see and hear each other and finish their business in reasonable time, limits individualism. People have to form alliances and attack hostile camps, divide and conquer, and do all kinds of things suggested by Machiavelli and warned against by Lao Tzu. But this is what Western civilization is about: action, competition, progress, bottlenecks, and demons. The more energy consumed, the more wasted. The more mass production, the more loss. The more progress, the more phony. And yet, this civilization of pushbuttons and price tags has an incredible seducing power because it makes every hermit to feel as comfortable about mundane needs as an emperor of the past. No, it is not the Epicurean ideal yet because it is afraid of death.

I hope to come back to this contradiction between competition and individualism once again.

I often heard from my father the Russian equivalent of the French *Que sera, sera* (*Что будет, то будет*). In this form, fatalism was an essential component of traditional Russian mentality. In the mythology of American westerns, it took, curiously, the form of "The man's got to do what the man's got to do," all the more, the happy end was granted. My fatalism was based on my very natural for the young age and Soviet (and Hollywood) premise that life was written along a scenario with happy end for each episode. Youth is as inebriating a doctrine as Christianity, Islam, and Marxism can be at times.

My belief in fate was essentially the belief in an unlimited time given to me. I would never test my fate with a loaded revolver, as the character in *The Fatalist* (and Lermontov himself) did, but I could too easily let myself get into a jam and watch with curiosity my own wriggling and attempts of self-extrication that would only get me deeper into the mess. Nevertheless, the moment of resolution always came with time.

Even after 30, I still believed that I could get out of any mess. I learned that every trauma of failure healed, given enough time, and the only serious peril for me could come from the lack of time. And, of course, the imminent lack of time is our ultimate fate. Fate is as subjected to aging, gloom, and general disappointment in life as people who believe in it. Fate is our reflection in the mirror. The words “characters is destiny” have been attributed to various sources from Heraclitus to Napoleon, of which the former is the oldest source.

Now I understand that my form of fatalism had a good deal of arrogant but lazy individualism in it: a very disrespectful way to interpret Taoism and Buddhism. Haste is the enemy of anything lasting and procrastination is a friend of nothingness.

Nevertheless, I am still fatalist in the sense that my personality is something as useless to fight as the laws of nature. I cannot change the deep and general causes of events, neither can I ward off their consequences, nor can I change myself. This is why I tend to avoid acts of extraordinary effort, subconsciously mumbling *que sera, sera.* Of course, the true reason could be just a lack of energy caused by the Taoist genes.

I am telling myself that only extraordinary things are worth extraordinary efforts, but extraordinary things are such only because they are hard and near impossible to reach. The vicious cycle of this reasoning is not a good philosophy for America. But let us turn to the Faustian philosophy:

> Nur der verdient sich Freiheit wie das Leben,
> Der täglich sie erobern muß. (*Faust*; Appendix 3)

I translate this as:

> Only those deserve freedom **as they deserve life**
> Who have to take it by force daily.

I find it rather harsh and inhuman. It sounds to me like "*Arbeit macht frei*." No, to fight daily is not freedom, it is slavery.

But *Faust*, one of the first surrealist works, has no single rational interpretation. This is not *Lorelei*.

Any form of fatalism is very bad for a highly competitive society where only the philosophy of fight brings advancement. And yet I am not quite sure that fight should be worshipped because sooner or later one faces a stronger contender than himself. Should I do something I enjoy doing or something that I hate but need to do in order to defeat my fate? What is my fate? Being myself or being like somebody else? Fight speeds up the arrival at the equilibrium with the pool of contenders and finding somebody's true value (level of incompetence, as in Murphy's laws).

I would not recommend Lao Tzu to anybody in America. Besides, it contains a profound contradiction: written by a hermit, it is an instruction to a leader!

Fortunately, besides the bleak theory, there are some more promising pragmatic aspects of fatalism.

I believe that this world exists because the laws and forces of nature are mostly compensating each other—otherwise the world would collapse into dead calm long ago. If there were adverse as well as favorable laws, one could use the latter to move forward, as the sailor uses tacking to go upwind and jibing to go downwind. The two modes of movement exploit two completely different laws of fluid dynamics and disable the third law that forbids sailing directly against the wind. One cannot sail "through the eye of the wind," as sailors say, but this is all we cannot do and there are plenty of other things that we can, with the positive final effect.

Therefore, I can give my fatalism a more accurate definition: no wind, no sailing. What is really useless is to sail without wind. My habit of leaving the decision to fate means only that at the dead calm the wind is beyond my power.

Although I cannot recommend my fatalistic philosophy to anybody, I suspect that all the inspirational examples of winning through individual persistence prove only one thing: there were at least two different laws of nature, and the person was flexible enough to use them both in different ways. In short, there was wind. If there was wind, there was the open race for the Fate Cup.

Is my position pessimistic or optimistic? Clearly, pessimism and optimism are not the opposites but just the two ends of the same scale, like cold and heat, darkness and light, order and chaos.

One way to understand somebody's position is to look at its opposite. Fatalism, remarkably, has not one but two other ends of its scale, as if it were a two-dimension object. One "other" end of the fatalistic scale is a complete unpredictability of the future, which I reject. The other "other" end sounds like an advertisement of a mouthwash: "You can do it! Just try hard, knock on every door, and leave no stone unturned. If you want it very much, you will get it." No, if I know that it is impossible to sail through the eye of the wind or at dead calm, I am completely fatalistic about it. My fatalism is a direct consequence of inability to form a network of links with other people. I cannot raise an army of wind blowers. Character is fate.

The most powerful laws of nature tell us about what is impossible. One of them, commonly disputed, is that it is impossible to change one's own nature for the reason that, by definition, our nature is what is impossible to change. The eternal human obsession with snake oil and how-to books is an oblique acknowledgment of this simple truth.

What is possible to do in times when the wind of history drops dead before changing its direction is to wait. This is why we are given the blessing of old age: it brings, unbelievably, the ability to wait. The curse of the old age is that there is no time for anything but waiting.

My boat has always been overloaded with books and dreams, but it is still the cargo I hesitate to jettison, in spite of leaks. I can now do what I was never able to do before: wait. I can do what is senseless.

APPENDIX

1. How to control your fate:

Out of 38,217 titles with the keywords *how to* (Barnes and Noble, May, 20002) , the top of the best-selling list includes:

> ***** How to Be a Great Lover ***** How to Sculpt Your Ideal Body, Free Your True Self, and Transform Your Life with Yoga ***** How to Give Her Absolute Pleasure ***** How to Express Heartfelt Commitment to Your Mate ***** How to Make Love All Night: And Drive Woman Wild ***** How to Win Friends and Influence People ***** How to Be a Domestic Goddess: Baking and the Art of Comfort Cooking ***** How to Become a Rainmaker: The Rules for Getting and Keeping Customers and Clients ***** How to Raise a Puppy You Can Live With (which assumes a possible dramatic discord between human and canine fates). *****
> The twenty-fourth place from top belongs to: How to Get Rich Quickly and Stay Rich Forever *****

While it is quite possible to learn good baking and even raise a good puppy by the book, to transform one's life is a more challenging task.

Nevertheless:

> ***** Take Control of Your Life: How to Control Fate, Luck, Chaos, Karma and Life's Other Unruly Forces ***** Awaken the Giant Within : How to Take Immediate Control of Your Mental, Emotional, Physical amp Financial Destiny! ***** Risk-Takers: How to Make Your Destiny Reality ***** God the Astrologer: Soul, Karma, and Reincarnation--How We Continually Create Our Own Destiny *****

2. Albert Camus, *The Rebel*:

> Already, as we can see, the great problem of modern times arises: the discovery that to rescue man from destiny is to deliver him to chance. [Originally published in 1951]

3. Johann Wofgang von Goethe, *Faust*:

> The last monologue of Faust:
>
> FAUST:
> Ein Sumpf zieht am Gebirge hin,
> Verpestet alles schon Errungene;
> Den faulen Pfuhl auch abzuziehn,
> Das Letzte wär' das Höchsterrungene.
> Eröffn' ich Räume vielen Millionen,
> Nicht sicher zwar, doch tätig-frei zu wohnen.
> Grün das Gefilde, fruchtbar; Mensch und Herde
> Sogleich behaglich auf der neusten Erde,
> Gleich angesiedelt an des Hügels Kraft,
> Den aufgewälzt kühn-emsige Völkerschaft.
> Im Innern hier ein paradiesisch Land,
> Da rase draußen Flut bis auf zum Rand,
> Und wie sie nascht, gewaltsam einzuschießen,
> Gemeindrang eilt, die Lücke zu verschließen.
> Ja! diesem Sinne bin ich ganz ergeben,
> Das ist der Weisheit letzter Schluß:
> Nur der verdient sich Freiheit wie das Leben,
> Der täglich sie erobern muß.
> Und so verbringt, umrungen von Gefahr,
> Hier Kindheit, Mann und Greis sein tüchtig Jahr.
> Solch ein Gewimmel möcht' ich sehn,
> Auf freiem Grund mit freiem Volke stehn.
> Zum Augenblicke dürft' ich sagen:
> Verweile doch, du bist so schön!
> Es kann die Spur von meinen Erdetagen
> Nicht in äonen untergehn.--

Im Vorgefühl von solchem hohen Glück
Genieß' ich jetzt den höchsten Augenblick.

Translation:

FAUST. A marshland flanks the mountain-side,
Infecting all that we have gained;
Our gain would reach its greatest pride
If all this noisome bog were drained.
I work that millions may possess this space,
If not secure, a free and active race.
Here man and beast, in green and fertile fields,
Will know the joys that new-won region yields,
Will settle on the firm slopes of a hill
Raised by a bold and zealous people's skill.
A paradise our closed-in land provides,
Though to its margin rage the blustering tides;
When they eat through, in fierce devouring flood,
All swiftly join to make the damage good.
Ay, in this thought I pledge my faith unswerving,
Here wisdom speaks its final word and true,
None is of freedom or of life deserving
Unless he daily conquers it anew.
With dangers thus begirt, defying fears,
Childhood, youth, age shall strive through strenuous years.
Such busy, teeming throngs I long to see,
Standing on freedom's soil, a people free.
Then to the moment could I say:
Linger you now, you are so fair!
Now records of my earthly day
No Flight of aeons can impair -
Foreknowledge comes, and fills me with such bliss,
I take my joy, my highest moment this.

4. Lao Tzu, *Tao Te Ching*

Verse 2

第二章

天下皆知美之為美，斯惡已。皆知善之為善，斯不善已。
有無相生，難易相成，長短相形，高下相傾，音聲相和，
前后相隨。
是以聖人處無為之事，行不言之教；萬物作而弗始，
生而弗有，為而弗恃，功成而不居。夫唯弗居，是以不去。

Translated by Richard Wilhelm/H.G.Oswald (Lao Tzu, *Tao Te Ching: The Book of Meaning and Life*, Penguin 60s Series):

2

Thus is the Man of Calling.
He dwells in effectiveness without action.
He practices teaching without talking.
All beings emerge
And he does not refuse himself to them.
He generates and yet possesses nothing.
When the work is done
he does not dwell with it.
And just because he does not dwell
he remains undeserted.

5. Wu wei applies, probably, to a philosophy of a steady-state civilization. Whether the Western civilization of things can still come to this state, remains unclear. Regardless of any cosmic issues, the following verse (translated by Richard Wilhelm) strongly resonates in me.

29

Conquering and handling the world:
I have experienced that this fails.
The world is a spiritual thing
which must not be handled.
Whosoever handles it destroys it,
whosoever wants to hold on to it loses it.
Now things run ahead, now they follow.
Now they blow warm, now they blow cold.
Now they are strong, now they are thin.
Now they are on top, now they topple.
Therefore the Man of Calling avoids
what is too intense, too much, too big.

6. **A beautiful example of looking ahead and sensing the ugly fate**: Bernard Lewis anticipating in 1990 the conflict between the Muslims and America.

2002

Essay 37. On the Soul

[super-strong AI, non-traditional soul definition, Aristotle, empathy, logical paradox, Russian soul, chemical bond, Jeremy Rifkin, Marian Hillar]

For some reason I am still interested in the words that for millennia had been as common and clear-cut terms of everyday speech as horse, bread, and fire, before they retired to theology and philosophy. If we use them, they mean something.

As if the subject of fate was not enough (**Essay 36, On Fatalism**), I am picking up another phantom from the same Addams family. The soul is so vague a concept, spread over so many meanings, that it seems just a figure of speech, even in religious context.

Hard science has neither interest in the soul nor a place for it. Only in popular discourses on Artificial Intelligence (AI) and in related journalism the word is sometimes used as a shortcut to the property of being recognized by other humans as human. Traditionally, the soul was the term for what distinguished the human from the plant, animal, machine, and thing. The so-called strong AI extends the privilege to advanced machines, which could be built in the future.

The over fifty year old debate around the question whether machines can have mind and soul is still smoldering. *The Mind's I: Fantasies and Reflections on Self and Soul* by Douglas R. Hofstadter and Daniel C. Dennet (New York: Bantam Books, 1981) was a landmark anthology of science and fiction views on the subject. Can we distinguish between a real thing and its exact simulation, or, as Douglas Hofstadter commented on a sci-fi story, "what is the difference between a *simulated* song and a *real* song?" We can substitute *soul* for *song* in this question.

Can an artificial person be created? Could we treat it is equal? Will it have a soul?
The discussion on the ultimate possibilities of artificial intelligence in reproducing human nature is over half a century old. In the enormous literature, a few sources have the word soul in the title, others in the text. The sci-fi movies, like the film *AI* by Steven Spielberg, carry the banner on.

The witty shortcut **sci-phi** (J.D.Casnig; now at http://knowgramming.com and http://www.sciphijournal.com/) is very appropriate for the whole area of modern philosophy of science where AI is only part of the discussion on the subjects not

verifiable by experiment at the present time. Mental constructs, however, can be tested by logic. The arguments are about axioms and terms. The volcanic activity in sci-phi testifies that our understanding of such old words as life and mind changes: larger categories take shape.

History stores the record of our changing attitude toward "the savages," first hunted like animals and brought as zoo exhibits to Europe, later hunted for domestication as slaves, but then moved to freedom through the Underground Railroad and later elected to US Congress. Each time I see a movie about "primitive cultures," and especially about the first contacts with remote tribes, I cannot notice anything that would suggest any inborn divide between them and us. It was religion that first recognized the human **soul** in them, paradoxically, judging by the appearance and Natural Intelligence and not by culture. Similarly, our attitude toward our electronic creations of a very different appearance may change with time, as it has been changing regarding the whales and elephants that have a civilizing influence on us.

I am circumventing the discussions around Artificial Intelligence here not only because the debating sides do not give a definition of the soul. As a chemist, I pay little attention to the distinction between the Natural and the Artificial. Of course, there is no difference between two objects meeting the same criteria, as there is no difference between the natural and synthetic versions of vitamin C.

A **pure individual** chemical compound does not carry a tag certifying its origin. This is one of little appreciated laws of chemistry: the law of constant composition, first formulated by Joseph Louis Proust in 1794. It says that the composition of a pure compound does not depend on its origin (i.e., natural or artificial or made by a particular person at a particular place), which implies that neither do its properties. The question is: what is the pure and individual subject of our discussion? Curiously, the same question arises in logic: are we talking about the same subject or do we change it along the way?

Soul—chemistry—logic: could there be a stranger trio? An exciting choice for Essays à la Montaigne; let us keep the two no-nonsense outsiders in mind.

I want to understand what it means to have a soul.

Meaning evolves as anything else. The words may walk on the surface of the earth but then decide to crawl into deep caves or even sink to the ocean floor. The meaning and the connotations of the word *horse* have changed, and so has the usage of the words *honor*, *virtue*, and *nobility*, which are now stored in the social memory of the advanced industrial state side by side with *quill*, *crinoline*, *typewriter*, and *telephone switchboard*.

In our world of man-made Things, humans are turning into enzymes in complex metabolic webs where the turnover of money, more important than the alternation of day, night, and seasons, brings the crop of products for sale from the social soil tilled by social machines under the artificial sun of burning mineral fuel.

While our human nature still holds well under the attack of stress, **artificial** chemicals, and the accumulation of genetic defects (I swear, I am not a social critic, please), we are starting to pay attention to the suspicious changes in our social biochemistry. I remember well how, before the advent of molecular biology, serious people believed that some new and unknown principle could be hidden in the phenomenon of life. Experimental science put an end to all such expectations. What about the soul? Entering this new world—which is of course just the next stage in the evolution of the old world—we might reconsider the meaning of some old words. As we may need a set of new terms to understand and describe the modernity, the pre-modern words could be as good as the derivatives of the classical Greek and Latin. We would do with a prefix: meta-life, meta-mind, meta-soul.

Pushing aside religion, philosophy, social psychology, and AI, I am turning to Aristotle, who not only established criteria of the **purity of thinking**, still used today, but also left us a relatively short book *On the Soul* where he attempted to look at the subject, using only the powers of logic and suppressing belief, emotion, and fantasy. Roughly, the soul is what distinguishes life forms, including animals and plants, from other forms of matter. This is not enough for us, of course.

Why do we need to read Aristotle who lived twenty-three centuries ago? Because we do not need to. It is a useless and impractical waste of time, a futile indulgence, which is exactly what separates us from the dapper and efficient machines. We cannot learn anything from him that would help us with work, wealth, business, research, love life, health, and beauty. Aristotle's writings are dry and, with the exception of logic, hopelessly obsolete. They serve only as the material for an occasional student of philosophy and history of science to write a thesis and climb the next career step.

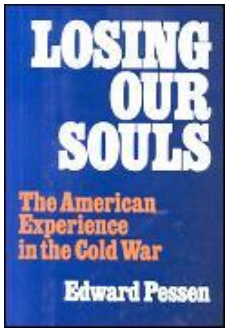
Not only Aristotle but also the soul itself is beyond any practical use, utilitarian benefit, and instrumentality. Nevertheless, reading Aristotle does something *to the soul* of the reader who is aware that our view of the world grew from some pots on Aristotle's windowsill. Aristotle purifies the muddled soul and the mind, but if it too sterile, Aristotle spreads germs of new ideas in it. New ideas can be misunderstood old ones.

> **NOTE** (2016) Aristotle demonstrates how we can understand something by analyzing our thinking about it and formulating questions where we did not suspect any. He does it by using analogies and examples from other areas. If after 9/11 we applied this method to militant Islam, terrorism would be already subdued. We would look for an analogy and found it in the Cold War with Russian Communism. We would ask what both had in common and realized that both were religions with sacred written codes that named their old enemies by names that mean today, roughly, the West. .

Aristotle was at the initial building and furnishing of some most important compartments of our civilization: logic, science, art, and ethics. Most important, Aristotle, together with his teacher Plato, was *the* architect of the Western cult of unrestricted questions and answers. Aristotle is a whole planet and his boring and complicated texts look like a landscape of majestic cosmic beauty, which could be an intense pleasure to visit and, refreshed by a diversion, return to the familiar health, love, and money worries.

Of all our faculties, the soul is the least needed to earn a living. We cannot even sell our own soul to the extremely difficult to reach devil who is busy with other things and probably would not give a damn for it. Whether we have souls or not, whether they are immortal or die with us, and whether the heaven or the hell is their final destination is of no relevance for any practical matter in the modern world. And yet long before Aristotle and up to modern times, the **fate** of the ***soul*** (I have caught up the ghostly couple together!) has been a matter of big concern for many people, and, as Max Weber thought, even a motivation for the development of the capitalist way of production. What an irony: the capitalism of the third millennium, allegedly born from the Protestant ethics, is as much about the soul as entomology about whales.

Disinterested in the religious and ethical views of the soul, I am nevertheless fascinated by the questions: What does it mean to have a soul in our times and what does it mean to lose it? Is there any rational interpretation of the soul, one of the most ancient and irrational creations of human mind?



Believers or not, we stick to the soul as a metaphor. Not too often, but one can run into a completely secular question **"Are we losing our souls?"** (search losing our souls with Google; only 558 hits in July, 2002: remarkably little concern! 30,300 results in 2016; not much)) on printed (see the book cover on the left) and electronic pages.

SOME EXAMPLES:

1. Philip E. Agre , The soul gained and lost; artificial intelligence as a philosophical project .

2. **:** "Persons in commodified relationships are there to 'serve' or 'perform,'" Jeremy Rifkin writes. In this environment, what happens to empathy? What happens to the individual soul in relation to other souls? (See **APPENDIX 11**)

Every metaphor is a connection (transfer) between two objects. Is there anything tangible behind the soul or is it just an echo of the word? I am looking for the place of the idea of the soul in the changing system of our civilization. Is the soul a legitimate dimension of the process? If so, the soul is not of the all-or-nothing kind. Are we really losing our souls? If yes, to whom? The machines can have a mind of their own, but can they have soul? Does **super-strong AI** ("besouled") make sense?

In this Essay I deliberately limit myself to Aristotle as the only literary source. It seems to me that his *De Anima* (widely represented on the Web) provides an interpretation on his own terms. In the sci-phi forum, Aristotle has as much to say as anybody else.

NOTE. An excellent study of the problem of the soul in Aristotle's *De Anima* by Marian Hillar is available on the Web. In the world of information, it is the body, the hard copy, which is practically immortal. The weightless electronic information is as mortal as heavy human flesh. Fortunately, Marian Hillar's work is published in *Contributors to the Philosophy of Humanism*, M. Hillar and F. Prahl, eds, Humanists of Houston, Houston, 1994, pp. 51-82. His personality and works on humanism (for example, on universal ethics) deserve independent attention.

Evidently, the subject of the soul was difficult for Aristotle.

To attain any assured knowledge about the soul is one of the most difficult things in the world

The soul is so much unlike anything else that Aristotle discusses the method of study at a great length and often, short of rigorous logic, uses comparison, parallel, analogy, and metaphor. The reason for this is easy to see: the soul has no larger category to fall into. It is what remains in life if we subtract from it the observable material body. In the end, Aristotle takes the only possible secular way. He simply lists all aspects and species of phenomena comprised by the vague notion of the soul, as if defining the concept of the animal from all particular species of animals. His book is traditionally entitled in Latin *De Anima*, but if we remember that the soul in Greek is ψυχή , psyche (or psuche), the subject of Aristotle looks the same as that of modern psychology, only against a wider biological background. Classification and analysis is where Aristotle feels at home. Analysis, unlike synthesis, never generates chimeras: it dismembers them.

Today practically all the elements and blocks into which Aristotle decomposed "the soul" belong to established areas of knowledge: biology, physiology, psychology, social psychology and Artificial Intelligence. Having completed the analysis of the soul, Aristotle did not find any mystery. And yet reading *De Anima*, I had a feeling of the great mind's tension, struggle, and dissatisfaction, and it prompted me to look for something else. The problem for Aristotle was that while everything was clear about different parts of the soul, i.e., observable functions of the living organism and its mind, and the whole did not have any other function but life itself. The soul was just a sum of its parts. The abstract notion of soul was empty and shallow because it was circular:

> From all this it follows that soul is an actuality or formulable essence of something that possesses a potentiality of being besouled. (*On the Soul*, End of Book 2, Part 2)

For Aristotle, the soul was the set of all faculties of life, starting from the lowest and adding up. For example,

> The soul of animals is characterized by two faculties, (a) the faculty of discrimination which is the work of thought and sense, and (b) the faculty of originating local movement. (Beginning of Book 3, Part 9)

The plants have the nutritive faculty, and so the animals and humans have it, too. The faculties of the soul, therefore, form a pyramid of a kind, with plants at the foundation and humans at the top. I have an impression, however, that Aristotle pondered on the possibility that even inanimate things could form the foundation of the pyramid:

> Suppose that what is literally an 'organ', like an ax, were a natural body, its 'essential whatness', would have been its essence, and so its soul; if this disappeared from it, it would have ceased to be an ax, except in name. (Book 2, Part1)

Yes, let's suppose that for a moment: not an ax but a robot..

A possible interpretation of the Aristotelian idea of the soul can be found in his metaphoric explanation:

> It follows that the soul is analogous to the hand; for as the hand is a tool of tools, so the mind is the form of forms and sense the form of sensible things.(Book 3, Part 8)

The hand is the tool of tools because it can manipulate and use any tool, including an unfamiliar one. The mind is the form of forms, for example, because it can perceive the meaning of many verbal expressions, images, sounds, etc. The sense, such as vision, is capable of perceiving any visual image, not necessarily understanding it. Hearing perceives all sounds, etc.
It seems to me that in the above quotation Aristotle took some liberties with analogy. He says that the soul is analogous to the hand but further he takes only the parts of the soul, as if speaking about the hand he meant only its fingers. The complete analogy should be: the soul is analogous to the hand; for **as the hand is** a tool of tools, **so the soul is** **is what?**

Aristotle refuses to give a general definition of the soul other than in terms of its parts.

> It is evident that the way to give the most adequate definition of soul is to seek in the case of each of its forms for the most appropriate definition. (Book 2, Part 3)

Aristotle understood—it is only my guess—that, regarding the soul as a whole, he would end up in a vicious cycle: soul is soul, as life is life. And this is true about modern science, where there is a general and detailed understanding of what life is, but no satisfactory definition of life, and, for that matter, of energy, either.

The closest modern translation of the term *soul* in Aristotle is bio-life, which comprises all general functions of the body.

> It is a fact of observation that plants and certain insects go on living when divided into segments; this means that each of the segments has a soul in it identical in species, though not numerically identical in the different segments, for both of the segments for a time possess the power of sensation and local movement. That this does not last is not surprising, for they no longer possess the organs necessary for self-maintenance. But, all the same, in each of the bodily parts there are present all the parts of soul, and the souls so present are homogeneous with one another and with the whole; this means that the several parts of the soul are indisseverable from one another, although the whole soul is divisible. (Book 1, Part 5)

This remarkable paragraph becomes completely modern if we substitute life for soul and a life function for a part of the soul. Life divides and multiplies, while its functions are indivisible and we cannot have hearing without breathing. There is no place for the separate faculty of having a soul in the scientific and rational picture of a human being. Taking life apart, we find no such part as the soul *per se*.

Nevertheless, a consistent version of Aristotle's analogy would look as:

> As the hand is a tool of tools, the soul is the X of Xs.

Aristotle's formal logic did not admit self-reference. But we can attempt it:

> **As the hand is a tool of tools, the soul is the soul of souls.**

Aristotle did not say that, and could not, because it violates his formal logic. But he expressed the idea elsewhere in an uncharacteristically informal way.

> The thinking part of the soul must therefore be, while impassible, capable of receiving the form of an object; that is, must be potentially identical in character with its object without being the object. (Book 3, Part 4)

That could be generalized by substituting soul for object as:

> The "soul proper" part of the overall soul must therefore be, while impassible, capable of receiving the form of another soul; that is, must be potentially identical in character with its object (another soul) without being the object.

This means that the human soul is something that recognizes souls of other beings as identical in character with the soul of the observer. The soul, therefore, could be just another separate human "faculty." To give a far-fetched metaphor, it reminds me the surprising ability of dogs to recognize another dog from afar or even by the sound of its steps.

This does not necessarily mean compassion. We may hate the guts of another person (*the guts* stands for the soul). The soul is the ability to identify oneself with other beings, and,

for that matter, not just human beings. A person can identify himself or herself with other persons, fictional characters, poets, animals, gods, and even forests, atmosphere, and the finite resources of mineral fuel. The soul is the ability to substitute somebody's soul for one's own, albeit for a short moment. This is possible because all souls are interchangeable in the sense the electrons are in molecules. The response may be positive, as well as hostile. A terrorist watches with great satisfaction the terror of another soul even if he is driven by love to something.

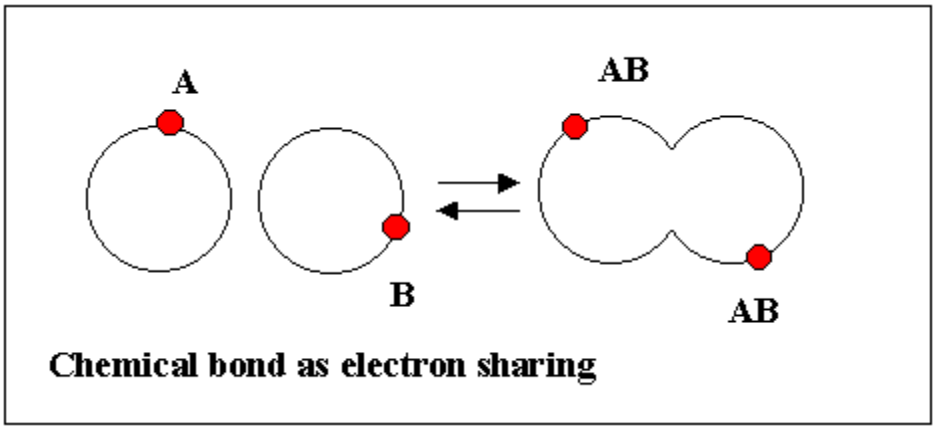
One thing is to recognize a tree or a bird, but quite another is to recognize oneself in the other. The reason for that is that while, along Aristotle, we do not really have stones and birds inside, only their forms, we certainly have our selves inside our bodies.

The soul as a separate human faculty, in my opinion, means not identification with a group, as in social psychology, but with another soul. A soulless human being is strictly functional, like a machine. It has a purpose and a means to achieve it. Anything not related to the function is ignored or tackled as a distraction. A human being with the soul recognizes itself in another human being. I fear death and so does he or she. I suffer, and so does he or she. He is like myself. For a short moment, both souls—mine and the other's—are in joint possession and exchanged freely. When I look at my dog *who* looks at me, I feel for both the dog and myself, and so does the dog *who* expects me to take him for a walk. Can we look the same way into the eyes of a robot? If we can, than the robot has the soul, but only if the robot sees a soul in us and regards us as one of **them, robots**.

The human soul falls into a larger category, as life does: there is **soul**, as there is life, not necessarily of biological nature (which is one of the main motives of my Essays: the life of Things).

From the pragmatic point of view, this may seem quite irrational. One primary indivisible and singular term—self—is substituted for the other. We see an elephant in ourselves and ourselves in the elephant. The elephant does not see us as elephants. I really do not know about the dogs, but I suspect that my dog would see me as a kind of dog. For any practical functional purpose, it would be a fatal mistake to mix up myself and the other. Actually, acting as machines, we cannot mix up anything, as we cannot mix up letters while typing on the keyboard or keys while playing piano. A machine is not supposed to mix left and right.

I cannot find any scientific way to explain what I mean by the soul. As Aristotle did with the difficult topic of the soul, I would rely on a metaphor. The exchange and fusing of **self** and the **other** reminds me of the nature of chemical bond: covalent chemical bond is formed when electrons belonging to two different atoms become indistinguishable. When two atoms contribute one electron each to form a bond, the delocalization of their shared electrons lowers the energy of the combined atoms. Both electrons take the same "molecular orbital" and are indistinguishable. Curiously, such a joint possession leads to either a stable union (bonding orbital) or repulsion (anti-bonding orbital). The following picture is greatly vulgarized, to avoid technicalities.



I cannot escape the problem of the definition of the soul, and here is my definition:

The soul is the ability of a system to recognize the presence of a soul in another system.

This definition reminds of logical paradoxes because of its circularity. How to recognize the soul ("self") in another system? To check if the other system recognizes the presence of the soul in your system.

I believe this is what we mean by having a soul. The soul is not an organ but a relation. It is not *the self*, because *the self* is senseless without *the other*. The soul is a bond, an exchange of souls, as a chemical bond is an exchange of electrons. Whether it is a subject of psychology or social psychology, I cannot say. I would say that the soul manifests in any strong attraction to anything which is not part of an outside program of rational actions. What is programmed and nothing but programmed is soulless.

Naturally, one can have more or less soul. I would even measure the size of the soul as the size of the ethical neighborhood of the self (**Essay 24, On Myself**).

The soulless being is strictly functional, as all without exception existing creations of AI. It has no ethics. Nevertheless, the corollary is that it may be possible to make a robot with a soul because there must be a neurophysiological **mechanism** behind the soul, and any mechanism can be duplicated. I would reserve my guess (of a mathematical nature) about the mechanism for a separate Essay. Therefore, it would be inappropriate to call such a robot *machine*. Strictly speaking, we all are machines, but not all machines have souls.

To lose the soul means to become a machine. We can literally lose our souls to the machines who will appropriate them. Sci-fi or sci-phi?

All the above could be just a starting point. I am taken aback by what I have found.
I display some tentacles of the idea in the APPENDIX.

So much for the soul.

APPENDIX

1. The related problems of identification, empathy, and consciousness have been discussed in two different areas: artificial intelligence (AI) and social psychology. Come to think about it, the two apparently distant areas might fuse one day.

2. The famous article by Thomas Nagel *What is it like to be a bat? reverberated* in responses entitled *What is it like to be a Rock?* by Aaron Sloman, where one can find also answers to the questions what is it like to be:

that rock over there?
a sunflower?
a bat?
a (normal) new-born human infant?
in the advanced stages of Alzheimer's disease?
autistic?
a seer?
a woman?
a robot?

Finally, one can find a discussion on What is it like to be a Human (Instead of a Bat) by Laurence BonJour.

3. It seems to me that the religious idea of the soul is nothing but the idea of a tiny personal god. Monotheism simply kneads all the pagan gods into a dough and gives everybody a cookie.

4. Dictionary Definition

Soul (Soul), n.

1. **The spiritual, rational, and immortal part in man;** that part of man which enables him to think, and which renders him a subject of moral government; -- sometimes, in distinction from the higher nature, or spirit, of man, the so-called animal soul, that is, the seat of life, the sensitive affections and fantasy, exclusive of the voluntary and rational powers; -- sometimes, in distinction from the mind, the moral and emotional part of man's nature, the seat of feeling, in distinction from intellect; -- sometimes, the intellect only; the understanding; the seat of knowledge, as distinguished from feeling. In a more general sense, "an animating, separable, surviving entity, the vehicle of individual personal existence." Tylor. "The eyes of our souls only then begin to see, when our bodily eyes are closing." Law.

2. The seat of real life or vitality; the source of action; the animating or essential part. "The hidden soul of harmony." Milton. "Thou sun, of this great world both eye and soul." Milton. 3. The leader; the inspirer; the moving spirit; the heart; as, the soul of an enterprise; an able general is the soul of his army. "He is the very soul of bounty!" Shak.

4. Energy; courage; spirit; fervor; affection, or any other noble manifestation of the heart or moral nature; inherent power or goodness. "That he wants algebra he must confess; But not a soul to give our arms success." Young.

5. A human being; a person; -- a familiar appellation, usually with a qualifying epithet; as, poor soul. "As cold waters to a thirsty soul, so is good news from a far country." Prov. xxv. 25. "God forbid so many simple souls Should perish by the sword!" Shak. "Now mistress Gilpin (careful soul)." Cowper.

6. A pure or disembodied spirit. "That to his only Son . . . every soul in heaven Shall bend the knee." Milton.

5. Today some people, myself including, have a feeling that we live in the mixed society of humans and machines where the former distinctions are being eroded: people become more machine-like and machines more human. The humans with machine-guns are responsible for unthinkable atrocities to each other, the machines directed by humans are saving human lives, and some humans are turned into destructive suicidal machines by other humans. I firmly believe that the relation between humans and machines is the major defining conflict of the near future. Fast evolving machines, with their short—and shrinking—life cycle, dictate the organization and function of the incomparably more conservative human society where the life cycle is artificially extended, not without the help of the machines.

6. "*Losing Our Souls* [by Edward Pessen] is the first book to sum up the consequences of the cold war for Americans - the shifting ideals of our approach to international affairs; the building of our nuclear arsenal; the tactics used to combat "communist subversion" throughout the world and within the United States; the transformation of the American economy in response to security demands. Carefully reviewing the evidence, and writing with the authority of a distinguished historian, Mr. Pessen charges that American cold war policy has been disastrous for many of our cherished values and institutions."

7. Social psychology, interested in altruism, empathy, and compassion, deals with important manifestations of being human and "having a soul," without any interest in the soul itself. Thus, empathy and altruistic behavior raise a controversy similar to that of the soul of the machine. That we always act in self-interest and to decrease our stress is one of the old axioms of social psychology. New and controversial theories (C.D.Batson) admit that the pure altruism and active empathy are in competition with self-interest with variable outcomes. This area, however, is too closely connected with religion. I would

not be surprised, however, if the ability of identification with another person was given a status of a separate human faculty, rationalizing the soul, at last.

8. In the Russian culture, as I remember it, the exchange of the souls (which the Russians still consider absent from the affluent Western culture) consisted, ideally, of complete and intimate openness to each other and the selfless mutual support. The real soul mate or bosom buddy was supposed to stand for the other as for himself or herself ("to give the last shirt off his back"). Vendetta (blood feud) may present a negative version of the same "soul bond." The one who hates is as much attached to the object of his/her passion as the one who loves. Dostoyevsky noted, somewhat cynically, that a Russian may give you a shirt off his back and to kill you next moment. Isn't that true for any strong attachment? Bernard Lewis, a historian of Islam, noticed this contradiction in the attitude of the Muslims to America.

> At first the Muslim response to Western civilization was one of admiration and emulation -- an immense respect for the achievements of the West, and a desire to imitate and adopt them.
>
> In our own time this mood of admiration and emulation has, among many Muslims, given way to one of hostility and rejection. (From *The Atlantic Monthly*)

V. S. Naipaul in *Among the Believers: An Islamic Journey* (New York: Random House, 1981) saw it as an ongoing ambivalence.

9. Are "besouled" beings and soulless ones facing a possible future conflict? The age of machines is coming when more machines become less machine-like and more humans more machine-like. The advent of Things seems inevitable and irreversible: humans are going to serve the metabolism of Things, while Things are already serving the procreation of humans. Can that impose a deep tragic stress on humans, leading to their extinction as we know them? The situation is not quite new. The kingdom of Things is irreversible, but so is death. Humans were born not only with tools but also with the first burial rites. The mystery of death brought to existence art, religion, philosophy, and even science—all the ways to semi-immortality. Humans might adapt to Things as they have adapted to death.

10. Why do we identify ourselves with elephants? To feel better. No, really, why? Because most of us, at least in the West, are insulated from suffering, big family, hard work, hunger, and war. We turn to the elephants.

11. My quotation from Jeremy Rifkin's *The Age of Access: The New Culture of Hypercapitalism where all Life is a Paid-For Experience*,(New York: Jeremy P. Tarcher/Putnam, 2000) refers to page 246; on page 245, the following description of empathy can be found:

To empathize, one needs to reach beyond the confines of the self, to take up emotional residence in the being of another, and to feel another's feelings as if they were one's own.

Jeremy Rifkin also quotes Robert Jay Lifton (*The Protean Self: Human Resilience in the Age of Fragmentation,* New York: Basic Books, 1993, p.214.):

Empathy requires that "one include the other's humanity in one's own imagination."

Is empathy what we understand by the soul? Yes, as a way of speaking. But the *soul proper* is not exactly empathy because we do know what empathy is.

12. Excerpts from *The Mind's I: Fantasies and Reflections on Self and Soul* by Douglas R. Hofstadter and Daniel C. Dennet (New York: Basic Books, 1981).

> The true nature of meat eating, like the true nature of sex and excretion, is only easy to refer to implicitly, hidden in euphemistic synonyms and allusions: “veal cutlets,” “making love,” “going to the bathroom.” Somehow we sense that there is soul-killing going on in slaughterhouses, but our palates don’t want to be reminded of it (p. 114).
>
> When does a body contain a soul? In this very emotional selection, we have seen “soul” emerge as a function not of any clearly defined inner state, but as a function of our own ability to project. This is, oddly enough, the most behavioristic of approaches! We ask nothing about the internal mechanisms—instead we impute it all, given the behavior. It is a strange sort of validation of the Turing test approach to “soul detection” (p.115).
>
> Soul represents the perceptually unbreachable gulf between principles and particles. The levels in between are so many and so murky that we not only see in each person a soul but are unable to unsee it. “Soul” is the name we give to that opaque yet characteristic style of each individual. Put another way, your soul is the “incompressible core” that determines how you are, hence who you are. But is this incompressible core a set of moral principles or personality traits, or is it something that we can speak of in physical terms—in brain language? (p. 385)

It is always both. There is no function without *soma*, as the Greeks called the body, and the modern medicine keeps calling it, dealing with malfunction. When we pinpoint the function, we start looking for its somatic mechanism, and *vice versa*.

13. **Do dogs have souls?** If somebody does a serious research trying to find out if the dogs really identify themselves *in any way* with some people, we might have an answer.

I remember how our dog, a Saluki, suffering after a painful injection, was whimpering and trying to get into bed with me and my wife. As soon as she had been admitted between us and put her head on the pillow, she immediately got quiet and looked really happy. This does not prove anything. Yet one has some reason to suggest that, as the dog's master makes distinction between the beloved dog and all the other dogs, the dog

may make distinction between the master and all the other dogs and people in the world. If soul is bond, love is an evidence of a soul.

2002

Essay 38. On Football

(European football: soccer)

[soccer, justice, truth, competition, jury trial, jury consultant, 2002 FIFA World Cup, ethics, ordering chaos, evolution, social critics]

Unlike fate and soul, the works of justice are accessible to direct observation. We can accept the fate and prosper without the soul, but life without justice could be uncomfortable. Is justice yet another phantom from a bygone era?

I am indifferent to any sport except the European football. It is called soccer only in the USA, football everywhere else, and I see no disrespect in using the global name. parlance.

My interest in football is by no means passionate. I watch only the World Cup and only if I am in the mood. I do not even remember whether I watched the 1998 Cup, but I followed most of the 2002 World Cup.

I am attracted to football as an allegory of life. Like life itself, the game is based on cooperation and competition, individual abilities and teamwork, intelligence and physical strength, making mistakes, breaking the rules and being punished for that. The players can be happy and miserable, aggressive and gallant, determined and broken.

The action in football, as well as in real life, is composite and punctuated. It has a beginning, a sequence of episodes with their own beginnings and ends, and the final end. As the night sleep, vacation, or disastrous accident interrupt our life, so referee breaks the game with his whistle, until it is all over.

There is something old-fashioned in football. It looks anachronistically human on the American TV. The game of the entire world is practically continuous and can be stopped only for a short time. It resists the scorched-earth commercialization. The players do not rely on high tech gear to protect them from powerful collisions, falls, and hits. Football can be played naked and barefoot. It contains elements of both ballet and military strategy and employs some fine technique. Both the male dancers and football players often have exceptionally strong legs. The difference is that the ballet is learned by rote and football is always improvised. A good game is very fast and as densely packed with suspense as a good thriller. A low-level football, however, can be deadly boring.

The purpose of my Essay is not to extol football over any other sports game.
In this Essay I am going to put side-by-side football and court justice, but not because both tease the public thirst for entertainment. Football is a descendant of the Coliseum and the law claims the same Roman ancestry .

A layman who came from the dark (there was no jury trial in the Soviet Russia), I found the professional sport and system of justice some of the least engaging aspects of the American life. They both have roots in the all-human mythology, where the hero fights face-to-face with a villain, but the sweet American public grants reverence to both.

The suspense of the trial is the same as in a competition between two teams. It ends either in a victory of one of them or in a draw (hung jury). The similarity between trial and game is enforced by the presence of the judge on the bench and referee in the football field. The goal of the trial parties is to win each of the twelve jurors who, unlike the leather ball and the wooden football goal, are as human as the rest of participants, and, probably, even more.

In a courtroom, the outcome of a trial can be a matter of life and death for the defendant. In the field, however dramatic the game, it is about running fast, chasing the ball, and scoring goals. The football players—and a national pride—can suffer only traumas and humiliation. While life is life, football is a professional performance. Display of joy is welcome but anger and malice are off good manners.

Both contests start with the initial state of uncertainty. The outcome is not known in advance, although the probability of each outcome can be approximately evaluated beforehand. The more certainty, the less interest in the result, the more sensational the reversal of fortune.

From the point of view of thermodynamics, the contestants want to resolve the uncertainty, each party in a different way. They want to decrease chaos and turn it into a firm order, which requires thermodynamic work. Thus, the freezer spends electrical energy to decrease the chaos of molecular movement in liquid water and turn it into the much more ordered ice.

> **NOTE**: While chaos is always the same, given the degree of it, the same degree of order always corresponds to at least two (and up to a very large number) different particular orders. Order means one of several or many states of the system. Chaos means that we either do not know or are not interested in the actual state, or it changes too fast and we have a superposition of many states.

The court judge or the field referee could just declare the verdict before the trial or the final score before the game, but this is not how the system is designed. The law of the land requires the system to come to the final state on its own, following the ancient idea of justice as the opposite of tyranny and whim. The idea of justice, as the idea of truth in science, implies that there is a certain actual state of things that can be discovered.

I suspect that the ultimate reason why the trial by peers came to being. It was a strong gut feeling, long before any mathematics, that if any single person can be unfair even with the probability 0.5 (50%), the probability that twelve such people are unfair is very small (0.5 exp12 = 0.000244). The trial by peers, therefore, reflects a significant pessimism about human nature, which the practice of justice seems to confirm. Yet the probability that the jury is faire is exactly 0.000244, too. The institution of jury believes in the inherent fairness of people. But there is no jury to judge the notion of fairness. It is what you believe is fair.

The just (fair) verdict or the score must reflect the truth. In my eyes, this belief puts the concept of fairness on a shaky ground because the truth is a matter of personal belief, unless there are general criteria of testing it. If we regard the trial and the football match as experiments that reveal the truth, the criteria are not met because the experiments cannot be repeated independently.

If the purpose of the trial is to find the truth, it may not be found. Innocent people get sentenced to death and murderers go free. Nevertheless, in many cases, probably, most of them, the evidence is so convincing that the apparently impossible task of a unanimous stand of twelve independent people on a single issue can be achieved. The troubling problem for me is that the verdict has no outside proof of its justness. It is dramatically different from the scientific view that a truth is what can be confirmed independently by other scientists, similarly equipped, and cannot be refuted by any of them.

The trial is not about the truth: it is about the verdict. As it often happens, rigorous logic is not always practical. In fact, **probably**, most verdicts reflect the truth. It must be terrifying not to have an independent test. Riding the vehicle of justice could be as risky as driving, flying, and sailing, or even more. This is why doctors have malpractice insurance.

Is football fair? There are plenty examples of disputed referee decisions or even the very facts of the game. The 2002 World Cup had some incidents, too. The football is not about the truth, either. It is about the final score.

The monumental difference is that the crime is usually hidden from the public when it happens, while the football is all on TV with replays and close-ups.

The system of criminal justice is not widely trusted in America. In The Sourcebook of Criminal Justice Statistics, which "brings together data from more than 100 sources about all aspects of criminal justice in the United States," I found the response to the question "How effective is the American criminal justice system?" In particular, the answers concerning reaching just outcomes at criminal trials distributed in 2000 the following way:

Very effective	13%
Somewhat effective	55%
Not very effective	22%

Not effective at all 5%
Don't know 5%

In 2001 only 50% had a great deal of confidence in the US Supreme Court, and 31% had some.

I believe that this kind of negativism and pessimism has something to do with the very nature of justice. Different people have different understanding of the truth and justice, as well as of the function of the jury and the entire complicated system of the law formulated in an intimidating language and based on precedents and statutes that can go back for centuries.

EXAMPLE of an old view widely quoted on the Web:

> For more than six hundred years—that is, since Magna Carta, in 1215—there has been no clearer principle of English or American constitutional law, than that, in criminal cases, it is not only the right and duty of juries to judge what are the facts, what is the law, and what was the moral intent of the accused; but that it is also their right, and their primary and paramount duty, to judge the justice of the law, and to hold all laws invalid, that are, in their opinion, unjust or oppressive, and all persons guiltless in violating, or resisting the execution of, such law.
>
> Lysander Spooner (1852), straight from the chapter entitled: *The Right of Juries to Judge of the Justice of Laws.*

Besides, the general mistrust of any establishment is typical for an individualistic and competitive society. Another reason for the skepticism could be that only the high profile cases can be seen on TV, and a high profile case is something very much like a high class football. Both big court case and high-class football are loaded with uncertainty and energy in the form of money, and concentrated energy can produce various effects, including the unintended ones. When a lot of money is involved, all the probabilities are skewed. This is the major principle of social thermodynamics, as I see it.

With so many reasons, there must be a single and simple one (**Essay 28, On Simple Reasons**). Here it is. When the society is relatively homogenous and its members deviate little from the average, views on any subject, whether positive or negative, are mostly in agreement with each other. When a society is fragmented, balkanized, or antagonized (see **Essay 11, On the Rocks**), a consensus is hardly possible. For example, in a society of cops and robbers the view of justice would reflect the ratio of both. Regarding political issues, the same would happen in a society split into Republicans and Democrats.

There are games intermediate between football and trial: the open contest judged by a jury, for example, in gymnastics, ballroom dances, figure skating, and beauty pageants. It lacks the single referee and the contestants are not teams but individuals. At least in Olympic figure skating, fraud has been recorded, and I doubt that beauty pageants have any objective value. They have nothing to do with the categories of true and false. They

have something in common with the ancient justice based on torture or throwing the suspect into a river for the verdict of God. The survivor of the trial by water and fire was presumed innocent.

Football is not about the truth, either. Like any other contest, its only result is the final score. Nevertheless, the degree of justice or fairness may vary. In the whodunit stories, where the mystery is solved on the last page, the reader is engaged in the search for the truth because the author is its keeper. In the real court and field dramas, the verdict has no personal guarantor against any reasonable or unreasonable doubt. In an oppressive societies, like the China and Soviet and Putin's Russia, political trials always have the author.

It seems that the popularity of sports in America may be rooted in the wide spread belief that the competition in sports is just. I do not know what justice is, although I tinkered with justice in **Essay 30, Tinkering with Justice**.

Thinking about justice, I tend to believe that justice, whatever it is, can never be perfect by its very nature. Justice is the least socially stressful form of injustice.

I am intrigued by the difference in the way chaos is ordered in the courts and on the fields. In modern society the cost of order is energy in the form of money. In the totalitarian societies social chaos is ordered by mere physical force. The sports came from deciding a dispute neither by compromise, nor by tossing the coin, but by a fight.

A very small part of the football money goes directly to create the supply of ATP to the brain and muscles during the game. Most of it goes to decrease the probability of loss. One of the reasons for the high cost of the high-class team is that the football game is very hot. The number of events happening per unit of time and, especially, a high degree of chaos requires a lot of training to build order in the "society of mind," as Marvin Minsky described the general architecture of our intelligence. It is done by training and selecting and importing best coaches, strategies, and players.

The larger the base of selection, the more probable a lucky selection.
The larger the base of selection, the more costly any selection.
The worship of Lady Luck requires burning money on her altar.

Small random systems can have a large degree of uncertainty. A tossed coin, the smallest possible random system, has the maximal possible uncertainty of outcome until it hits the ground. Any highly ordered small system, for example, good clockwork, has a very low uncertainty. From a large enough real life system we can expect a statistically or sometimes analytically predictable behavior. Some of its states and changes from one state to another are impossible, others have a very low probability, and others are almost certain to happen. This is why we cannot manage the behavior of molecules in a volume of gas, unless we freeze them all, but can partially manage human behavior, individual as well as collective.

The way to success, therefore, requires managing a dynamic (changing) system of a certain size. Ambitious football nations go all around the world in search for best players and strategies. The stars are well paid. The FIFA World Cup is a large undertaking with a lot of teams, games, and assisting personal. In a large system, we can expect to get close to a kind of a natural truth: the roster of three top winners. To get to the truth even closer, we would force all the teams fight the entire year with each other, which is absurd. The Football Cup is an acceptable a*pproximation to a "truth*." I believe a mathematician could evaluate the fairness of this approximation. The competition, in a sense, is an experiment, like the separation of a shaken salad dressing into oil and vinegar, which allows for measuring their ratio.

Turning to the trial by jury, where is the large dynamic system that would provide a basis for approximating the truth?

Here we are facing a much larger and more general question about life-like systems (life, society, Things, ideas). Why do they grow?

Survival means managing chaos: decreasing the probability of failure and increasing the probability of success. Everything in the modern society is growing: government, bureaucracy, companies, sports, entertainment, medical care, and social problems? The life-like system grows because of the *mesoderm principle* (**Essay 15, On menage a trois in the Stone Age**): if two parts of a large evolving system interact, an intermediate part develops between them. Its function is to manage the interaction, i.e., to decrease chaos on the interface and stabilize the system.

The larger the system, the more chaos arises from the interaction of its components, the more new parts appear to mitigate chaos, the larger the system becomes. It all makes sense because the area of chaos becomes local, small, and less life-critical in a larger system.

The growth can go on only if there is a source of energy to feed it. This is why authoritarian societies prevailed in the early history: they did not burn the mineral fuel to grow food, as we do. The authoritarian hierarchy decreases its chaos by its very structure. It works like an air conditioner: cooling the room, heating the street. Naturally, the external temperature throughout history was high and war and pillage were the everyday reality. It seems to me that the American foreign policy for at least the last fifty years has been not to eliminate wars but to keep them local. This is a separate subject, however.

Bureaucracy and mediators of all kinds grow and cool down the system, reaching the size when chaos in the system is strictly local (no systemic crises) and it does not put the entire system in danger. In due time, they develop too much chaos themselves and require a new department to manage it. From the system where most people manufactured various Things, a hot dynamic capitalist type system moves, as some observers unrealistically extrapolated it, toward the state when most people just process information. The social organism differentiates into organs and tissues, and this may be an answer to a large segment of modern social criticism predicting the loss of work, soul,

order, values, culture, and democracy, in other words, the Western society as we knew it. We can as much indict evolution for the change, as the winter for the snow. We do not know what is going to happen, but we know that no growth lasts forever and we know basic thermodynamic alternatives in terms of temperature, energy, and entropy.

Back to the courtroom, the largest system with high uncertainty is the jury. It is large not because of the large size of the jury, which is moderate, but because of the complexity of each human member. To get a consensus from twelve human beings, often balkanized, seems an overwhelming task.

That everybody is presumed innocent until proven guilty is a part of mythology. The defendant is neither innocent, nor guilty: his position is uncertain. Moreover, the degree of this uncertainty (i.e., entropy) is usually rather low: there are facts and conclusions that have already justified the trial. The court game has been planned in a series of thought experiments. The strategy of the prosecution has been developed. What can the defendant's lawyer do to work against a high probability of defeat?

The mesoderm that has appeared between the lawyer and the jury during the last two decades is the institution of jury consultants. They try to decrease the chaos of the jury thinking by studying the behavior of jurors and recommending their selection before they take their sits in the box.

Here are some excerpts illustrating the work of the jury consultants.

1.

> The jury consultant can be a very important member of any defense/prosecution team. This psychologist uses numerous past studies of juror behavior in order to maximize the probability of a juror swaying towards his teams side when it comes time to decide the defendants fate. These consultants can be stunningly accurate and could make or break the trial. A particular example of a selection process involves the defendant's occupation--many jury consultants will immediately protest any teachers that are on the jury. It has been found that such members tend to be more judgmental and are likely to vote for guilty. Secondly, often blue collar workers are removed when possible. Its seems that these members of society tend to see things more in black and white with very little gray allowed (i.e., alternative explanations are rarely accepted).
>
> Jury consultants may also use a number of questions in order to evaluate a jury members personality characteristics. They will often (if working for the defense) try to eliminate anyone they define as having an authoritarian personality. Again these individuals are very judgmental and are very unlikely to sway from there stances. They also hold a large influence over jury members. A new personality measure that is often considered is a person's level of moral reasoning. This involves the level to which a person's moral beliefs have developed. For example, a high moral reasoning will go beyond the law if it seems to be morally unacceptable. They will also be less prejudiced towards

> racial and socioeconomic differences (something that is a major problem with today's courts).
>
> Michael Decaire, September 12, 1999

2.

> Moore set up pretrial focus groups to determine what characteristics would make a sympathetic or problematic juror for the defense, as well as what approaches to presenting its case would be most effective with any given jury.
>
> Through the first focus group and mock trial, Moore learned that the female members of the mock jury didn't believe the defense attorney and were much less interested in DNA evidence than the male jurors were. During jury deliberation, the women questioned the credibility of Miller's 911 call made after he found the bodies.
>
> "I see myself as the interface between the attorney and the jury or juror pool," said Barbara Rich Bushell, president of Jury Dynamics in Woodcliff Lake, N.J.
>
> Mary Morrissey, *Counseling Today,* April 1998

Can Jury Dynamics beat General Dynamics in the future?

3.

Tuesday, April 2, 2002— SPRINGFIELD—Prosecutors who won convictions in the Kristen H. Gilbert murder case spent $264,512 on experts, including $82,946 for a jury consultant.

> The highest paid expert was Jeffery Frederick, the jury consultant who received $82,946 for work in advising Assistant U.S. Attorneys William M. Welch and Ariane Vuono in finding 12 jurors from an original pool of 600.
>
> The defense of Gilbert cost $1.6 million, including $532,930 for experts and investigators. At $125 an hour, attorneys David Hoose, Harry Miles and Paul Weinberg earned a total of $1.1 million. (Judith B. Cameron, *Daily Hampshire Gazette,* April 2, 2002)

My intent here, as everywhere in the Essays, is not to judge any system, but to illuminate, often to my own amazement, the process of its evolution. Whatever exists, came from somewhere and will turn into something else. We can understand the origin and the fate of things by focusing on change, as well as on the stable patterns (I call them "drawers" in **Essay 32. The Split**). The change is on the surface of things and the patterns are in our mind. We would never notice one without the other.

The Western civilization, as some might believe, can be global someday. I believe so, too, because it is a civilization of man-made Things, and the Things have no borders,

culture, and historical memory, not yet. The essence of the process is the unstoppable development of the intermediaries in its organs and tissues. But the West may look quite different “someday” and almost beyond recognition.

The computers enormously amplify the ability of humans to create and process information, and this is why the previously narrow layer of symbolic analysts, as Robert Reich renamed the white collars in his *The Work of Nations: Preparing Ourselves for 21st Century Capitalism*, (New York: Alfred A. Knopf, 1991), exploded in the last two decades. The modern social mesoderm controls the natural chaos of the free society by controlling the exchange of information. The problem with the symbolic analysts is that the lion's share of the information they handle is useless by its very nature and is almost immediately lost. It is like the thousands of acorns the oak tree produces: few can ever put roots. Naturally, a food chain will inadvertently develop, absorbing more and more humans, with less and less opportunities to get to the higher tiers, more and more gray shade in the formerly snow-white collars, and more and more drones for a single Board queen. Will Artificial Intelligence unseat the sinful humans in the information business? Yes, when AI develops its own idea of sin.

The process of the interface differentiation is by no means new. It is a pattern as old as the merchant trade squeezed in between the manufacturer and the consumer. It is even older: as old as the alpha male who regulates relations between the members of his pack. Whatever we may think about the current course of events, to criticize it means to criticize our own human nature, together with the animal nature that gave birth to it, and even with the lucky design of the Solar System that gave birth to life on Earth.

It does not mean that such criticism as ridiculous. To act in a senseless way, without any practical goal, and to go against the tide means to have a soul.

But why not to judge? Because there is no justice. Instead, watching the development of the criminal system, we can see the evolution of the discovery of the **truth.** The idea of approximating the truth displaces the idea of justice. The new scientific and technological methods can do it better and better, pushing out moral categories. Of course, the industry—and therefore business—of truth (scientists, specialists, journalists, consultants, and experts) will further swell the mesoderm, unless some new factors step in. The substitution of facts and observable regularities of a scientific character for moral and ethical categories could be one of the most radical components of the current transformation of the Western civilization. I watch this process with historical fatalism: I will not see the advanced stage of the transformation, and the young people would not see anything different.

Coming out of the courtroom into the football field, we can feel an important difference. Not only the football field, but also the system itself is bigger. It allows for a stunning wealth of statistics.

The FIFA World Cup 2002 analyzes the games in terms of 65 different indicators (see APPENDIX 1) describing goalkeepers, goal-scoring stars, individual and team attack, defense, and disciplinary violations and punishments. Some of the indicators are relatively large numbers. For example, it was calculated that the finalists made over 2000 short passes and around 800 long passes during the Cup.

The four finalists were Brazil, Germany, Turkey, and Korea. Except defense and discipline, all four finalists were pretty close, and Turkey and Korea were surprisingly so. It should be noted that some analysts predicted a big disappointment for the fans of Brazil and Germany.

The team positions in the order of a decreasing attacking ability were:

1. Brazil
2. Germany
3. Spain
4. Turkey
5. Korea.

The positions in the order of decreasing defense were:

8. Germany
.....
10. Brazil
.....
23. Turkey
24. Korea

The order of decreasing disciplinary violations (yellow card) was:

1. Turkey
2. Germany
3. Korea
.....
18. Brazil

I have an impression that Brazil won the World Cup 2002 "because" of the highly disciplined team behavior while Germany was able to come second "because" of the high thermodynamic temperature of the game, as the violations testify. The statistics also shows that Brazil has a higher number of stars, while Germany is good at teamwork (long passes).

My impressions are by no means any approximation to the truth. It is a hypothesis. It cannot be tested by the statistics of subsequent World Cup Games because the teams will be different in four years. Nevertheless, analyzing a large number of results, one can develop the best strategy or just explain the results post factum. The size of the system in

the World Cup is incomparably smaller than that of society, but large enough to explore it with the purpose of discovering some "truth."

The closer the teams by their strength, skills, and style, the less justice can be expected, however, because the chances then come close to 50:50. Several times during the games, in a draw, after the additional time had been exhausted, the outcome was decided by striking penalties until an advantage was achieved. At this medieval stage of trial by fire, the previous game was completely irrelevant.

The court system does not provide such statistics. It demonstrates, however, in the same manner as football does, a gradual outflow of moral categories from the fabric of civilization. And that is one of my major observations about how our civilization evolves. We can see the vigorous evolution from Archimedes to Dean Kamen but a languid crawl from Aristotle to John Rawls.

This Essay is about criminal justice, which has a competitive aspect. The subject of justice is much larger and John Rawls is, probably, a good introduction.

Do we need justice? As Philip Rieff prophetically suggested long ago, in 1966, in his *The Triumph of the Therapeutic: Uses of Faith After Freud* (Chicago: University of Chicago Press, 1987 [1966]) all we need is to feel good about ourselves.

> **NOTE**: That was something social psychology found out about the same time (theories of cognitive dissonance and balance) and physicists knew since Archimedes about inanimate systems. History, however, is propelled by people who never feel good about something.

From a different angle, justice aside, the overall picture looks as follows:

1. Tools came to existence as extensions of human hands: they took place as mediators between the hand, driven by the mind, and the objects.

2. Specialists and consultants developed from the objects as mediators between the objects and the hand driven by the mind.

3. They meet and fuse in the middle in the process of the commercialization, mechanization, and "desanimation" of the mind, which evokes the reaction of numerous American social critics (Jeremy Rifkin, Christopher Lasch, Kenneth J. Gergen).

Criticism, justly or wrongly, presumes the existence of a truth of a right-or-wrong type, serving as a yardstick for justice.

Evolution is the greatest game we know—**The World Struggle for Existence Non-Stop Cup**—second, probably, only to the stock market. As in any competition, however, there is no other truth in any single act of evolution, other than the score, the verdict, and the success. There is no justice, either: victors are not judged.

Every trial is a one-time event and it does not provide any statistics to judge whether any truth is found. Only heavens know. Regarding justice, my personal conclusion is that justice in a divided, stratified, and fragmented society is contradiction in terms because the trial by peers is rarely possible. Capitalist democracy and justice for all are two bears in one den. Often, however, people are just people and neither wolves nor bears.

APPENDIX

1.

From *The Road to the Law*, by Dudley Cammett Lunt, Whittlesey House, New York, 1932, pp. 177-178.

> Criminal law has ever been the target of abusive comment. The complaints that it is over technical, too slow, cumbersome and productive of a wooden justice at best, are probably as old as the law itself. Yet much of this criticism is misdirected energy. It should never be forgotten that the criminal law is a product of human ingenuity and as such is possessed of the imperfections that characterize its creators. Furthermore, in the regulation of any anti-social activity a certain point is soon reached where, in the hackneyed phrase, a line must be drawn. The results are necessarily arbitrary. Finally, the abuses which the sons of men delight to decry are due more often than not, to the incapacity of those whose function it is to enforce the law, rather than to some vice inherent in the law itself.

2.

"Survival of the fittest," the mantra of Darwinism, drew a lot of criticism for its circular, and therefore meaningless, formula. It made many biologists feel uncomfortable. In my opinion, the formula is flawed because "survival" relates to the result of the game of survival, and the "fittest" relates to a truth derived from the "survival." Suppose the land is sinking and the ocean is rising. The fish seems the fittest, regardless of the outcome. In this example, however, the fish is not fighting another fish, and there is no contest.

3.

> For Aristotle, the philosopher is not a king, and the king is not a philosopher (the philosopher imitates the best life—God's—which is not political). The best life is the philosophical life; the philosopher is more noble and happier than the ruler. Truth is higher than justice.
>
> Scientific wisdom is higher than justice, but Aristotle gives "justice" to justice in the Ethics. (Gordon L. Ziniewicz).

4. The problems with the jury in modern society are well known. There is a whole Jury Bookshelf with such titles among others as:

> Judging the Jury, by Valerie P. Hans & Neil Vidmar (1986),
> We, the Jury: The Jury System and the Ideal of Democracy, by Jeffrey Abramson (1994),
> We, The Jury: The Impact of Jurors on Our Basic Freedoms, by Godfrey Lehman (1997).

The Runaway Jury by John Grisham (1966) is a caustic satire of the entyre system.

2002

Essay 39. Painting the Ice Cream Soup

[art, postmodernism, modernism, metaphor, temperature, chaos, order, Kenneth Gergen, Janine Antoni, Stephen Wolfram, J.D.Casnig, Jackson Pollock, Marcel Duchamp, Jasper Johns, cave art, fluid, solid, gas, the self]

Animation links refer to Web files. Click on pictures or links or see ESSAY 39 .

Irrationality is a precious gift of the artist and this is why art is a big mystery for the rational mind.

I am bimodal, i.e., semi-rational, on average. The largest part of my own conundrum comes from the transformation of art between the 1890 and 1910 that swept up music, literature, and visual arts.

The "modern"—today already over a century old—art, like the cave pictures from the Stone Age, leaves an evidence of a great evolutionary turn in human culture. One way to explain it is to change the paradigm and acknowledge that since the end of the nineteenth century, the Things, previously just part of human culture, have joined humans in a new bicultural society and even pushed them aside. There is an additional way to look at it, as well: through the evidence of the ***artifacts***.



The cave art in Europe (Lascaux) and the rock art in Africa (Tassili) testify of great climatic changes: the end of the Ice Age in Europe and the advance of the hot desert in Africa. I see a similar evidence of global warming in the images and sounds of modern art: the art melted down like glaciers, and the flood waters of a much larger and general meltdown shaped a new landscape.

Photography, movies, and travel took away the illustrative, informative, and reflective functions from art. The face-to-face contact of the viewer with art became complicated

because the art lost its own human face. The modern art lives with the *mesoderm* (Essay 15. *On Menage a Trois in the Stone Age*) of art critics and experts and is worshipped at the marketplace.

Many Things—car, computer, microwave, phone, and every electronic contraption—send messages to humans in the sign language of lights and beeps. Music and visual arts are naked and speechless. If their message is not directly recognizable by the common audience, the way the cave pictures were, the art becomes performance: an act or ritual addressed to the public and for the public. The common audience may not understand Samuel Beckett's *Waiting for Godot*—and there could be nothing to understand—but it may be entertained by the behavior, gestures, and verbal exchange of the actors, as the public was for centuries amused by traveling acrobats, circus, and side shows. Aristophanes and Shakespeare may convey high ideas, but the ideas are not a necessary component of art.

As chaos is always order and order is always chaos—and pure order and chaos are abstractions—art is always art, whether abstract or concrete. It comes in degrees and is defined in terms of its extremes.

What is modern art, then: atavism, investment, insight, prophesy, hoax, or circus performance? All of it, but mostly it is performance. This is why the genre of "installation/performance" gains so much popularity among aspiring artists (**Appendix 2**).

An artist does not need a brokerage of a critic to be influenced by another master. The viewer, too, can perceive a picture directly, without a mediator. But the art critic performs the same function as moral philosopher: he assigns value. Naturally, there is always somebody to dispute it. The community of critics, like that of the stock market gurus, comes to a certain equilibrium of opinion, where, like in a swarm of midges, extreme opinions are rare, and the core is well-shaped.

The word *performance* combines both meanings: the public display of an act and the rating of a participant in the competition, from "brilliant" to "lousy." An art critic has to perform, too, in order to attract attention and earn some living. Both the critic and the artist test the off-core positions, and if they pull the core toward themselves, their rating shoots up. The swarm can slowly travel along its own overall trajectory, split, and fuse. The performance of too critical a critic will be rated lower. The enthusiasts will be rewarded. The web of commercial relations is all-encompassing. The star performance attracts and inspires novices as they are drawn to the swarming market. And so the wheel of fortune spins: high rewards increase competition, high competition increases the top rewards and keeps the high inequality of Pareto distribution (Essay 31, *On Poverty*).

NOTE (2016). In the language of 2016, artists have their own 1%-niks.

An educated viewer, aided by art historians, can see the entire picture of evolving art, as a biologist sees the entire evolutionary tree of organisms—something no single picture or

organism can reveal. Nevertheless, a rational mind may ask a childish question: are these paint-splashed surfaces and urinals really art? The rational mind should better ask about the biochemistry of affection and greed. Art is deeply irrational, borrowing madness from love or avarice.

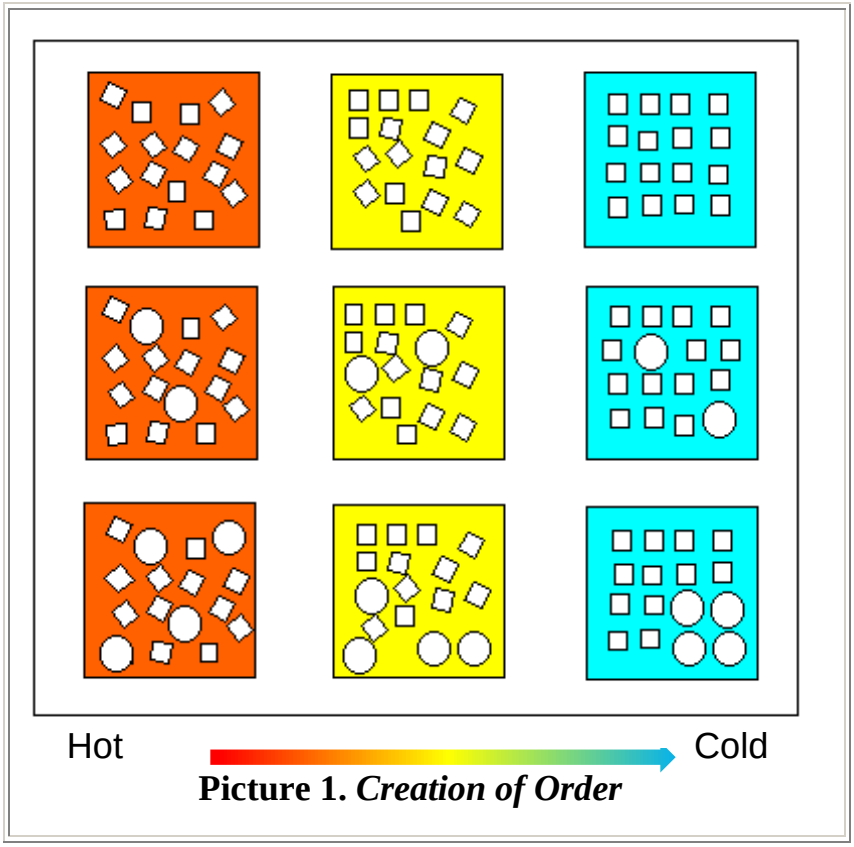
Fortunately, reason and insanity are as much conjoined twins as order and chaos.

I have already tried my hand in painting (**Essay 20, On Artificial Art**). Here I present a few new pictures of my own. In the stuttering language of art, I am coming back to the rational basics of our world.



The words within my frames are part of the pictures, like the labels on Andy Warhol's cans of Campbell's soup. As a revolutionary innovation, I separate the labels from their carriers.

← This is a meta-metaphor of some of the classical Andy Warhol's pictures. I it is colorful, informative, and not copyrighted.



Picture 1. ***Creation of Order***

The small squares and circles represent **particles**—molecules, people, groups, companies and any other individual and indivisible participants. The particles are moving and contacting each other within the colored squares symbolizing the borders of the system. The contact means that a particle is more or less aware of the presence of other particles nearby. Thus, molecules collide and exchange energy only with those nearby and people interact only with those whose existence comes to their attention. Because of the movement, however, the micro-universe around an individual molecule or person constantly changes.

We can draw a line between two distant points only because they both are in the sphere of attention within a single mind. For the same reason, we can introduce two persons to each other, although they had no idea about each other's existence. The classical science is about the contents of our mind (See **Appendix 4**).

For the sake of simplicity, the variety of particles in my pictures is reduced to just two kinds: squares and circles. The fraction of round particles increases, top to down, from zero to 1/3.

The terms "particle" and "movement" are not scientific terms designed so that everybody could use them in the same way (compare with **Appendix 1**). They are only my labels for the visual metaphors.

Picture 1 has three rows and three columns. The degree of order increases in each row, left to right. In the red column, the mutual influence is minimal, but in the yellow and blue columns the particles somehow coordinate their positions.

The first column corresponds to a high degree of chaos, which can be a result of high social temperature. In this state, we can call the system an **abstract liquid**. There is a certain close-range order, so that at a given moment, a particle interacts only with a limited number of neighbors, for example, in terms of human community, located within an hour of travel.

The top row portrays a homogenous system: it consists of particles of only one type. In the middle and bottom rows, another type of particles is added (belonging to chemical nature, social class, race, ideology, trade, party, etc.).

When the level of chaos decreases, the particles start segregating. The system solidifies. If the process of ordering is fast, the resulting order is partial: the system consists of segregated and mixed areas. If the second component is present in a small quantity, it can spread all over the solid (second row). If the "cooling" is slow, the components can segregate and crystallize in separated domains.

This and similar systems can be easily simulated with computers, as well as with ice cubes, water, and a freezer. The computer sociologists claim the discovery of the laws governing the social segregation and growth of the cities.

Over one hundred years before computers, chemists knew an important peculiarity of the phenomenon of melting. If we have two pure chemical substances, each consisting of only one type, they will have same or different melting points. The melting point of their mixture will be always **lower than the lowest** melting point of the pure component.

> Much later, it was shown that a very slow crystallization can perfectly separate the components, and that was used in the manufacturing of the ultrapure materials for the computer chips (zone melting). A similar spontaneous process is responsible for social segregation, for example, in the Hamptons (NY), Cape Cod (MA), and gated communities of the West Coast.

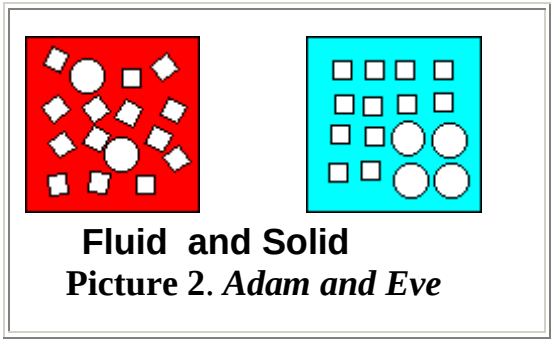
The "multicultural" society of human particles is much less prone to order than a pure one. This is a self-evident truth, regarding human societies, but I draw attention to the fact that the explanation does not depend on whether we deal with people or molecules, in spite of all great differences. The alien components, the dissidents, heretics, and newcomers disturb the original order, keep it liquid.

Historically, the stress of the social heterogeneity has been resolved either by repression, ethnic cleansing, expulsion, emigration, and secession, or by reforms and developing a new culture in which the differences are the norm, as it seemed to be the case with the American melting pot (see **Essay 11, On the Rocks**) and with modern art.

Picture 1 is static: it has no time dimension. It shows various degrees of order, but not the temperature.

Picture 2, ***Adam and Eve*** is **animated**.

Links: http://spirospero.net/AniMove.gif and http://spirospero.net/AniMo.gif



Fluid and Solid
Picture 2. ***Adam and Eve***

Who is what is up to the viewer.

At a high temperature (red), the particles in a fluid (liquid, gas) are chaotically changing their positions. At a low temperature (blue), they mostly dance around some average positions, as it happens in solids.

The degree of order and the range of movement and contacts increase from left to right. The particles discriminately interact with each other according to certain rules. In the figure, the attraction between same particles is higher than the attraction between different ones. It happens with partners and competitors, friends and enemies, and even men and women at some social gatherings, but not at a dance club. Every rule holds only statistically.

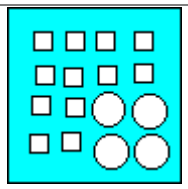


Picture 3. Temperature.

Yet even **Picture 2** does not give a clear idea of temperature.

This is what temperature is (ANIMATED): **Picture 3. Temperature. Links:** http://spirospero.net/AniMove.gif and http://spirospero.net/AniMoveFast.gif

Note that I **show** a visual metaphor of temperature instead of explaining it.



Picture 4. The Sins of the Righteous.

Picture 4. The Sins of the Righteous
(**ANIMATED**)**Link:** http://spirospero.net/AniMo2.gif

If the particles have certain internal complexity, as the humans have, they can change their individual properties, which is shown by occasional deformation of shape and order in **Picture 4,** which is a metaphor of sins.

Thus, an individual who sticks to a code of moral behavior, inadvertently violates the code, especially, in the heat of the moment. Most fine literature is about this moment and its heat. Not surprisingly, the Judeo-Christian code includes the mechanism of cooling the heat in the form of the promised forgiveness and remediation by penitence and ritual purification.

Every human is a world in itself, but all the worlds are designed in the same way because they are parts of a larger world.

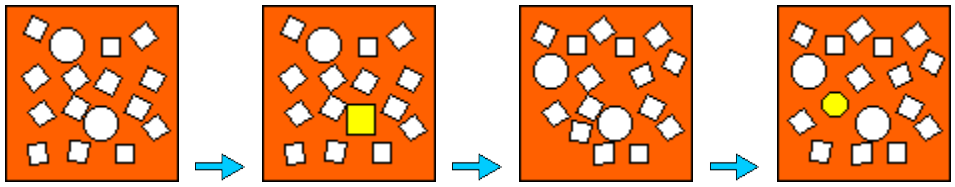


Picture 5. Loss of Self

Picture 5. Loss of Self (**ANIMATED**)
Link: http://spirospero.net/AnimoveBig.gif

Even for an attentive viewer it could be difficult to see the metaphoric message of this picture. What happens is explained in the next sequence of frames.

Frame 1: the lower circle is surrounded by five squares.
Frame 2: the lower circle conforms to its surroundings by taking the square shape.
Frame 3: two squares are under the influence of two circles.
Frame 4: one of the squares conforms to the environments by taking the round shape.



Picture 6. Stages of conformity

The abstract physics of "aggregate transitions" of both molecules and humans is more complex, but this is the benefit of the metaphor. We can use the metaphor, which tunnels through complexity, as a tool of understanding because it is **impractical**, as any poetry. To make and sell a product, we need knowledge. Note, however, that practically all products we make and sell, including the knowledge itself, never follow the scientific code to the letter. Nothing is ideal and absolute. The sins of science and technology are as forgivable (and punishable) as the sins of the soul.

> But poetry also sells! How can it be impractical? Because it is art. Let us leave this interesting paradox for later exploration.

To summarize, the squares and circles symbolize individual particles in the process of change. The change, which I call movement, concerns their positions within the colored

square. As an option, the particles can change on their own, regardless of the collective movement, which I show by stretching of squares and circles into rectangles and ellipses. The movement has a certain compound quality measured as the extent of change and its rate. I call the rate temperature.

This is my own interpretation of my "art," in line with other exemplary interpretations:

> Yuri Tarnopolsky, in his own words :
>
> My pictures convey the ideas of movement, order, and temperature.
>
> Jasper Johns
>
> In the *Seasons* (1985–86), this period's most ambitious works, Johns assembled artifacts and seasonal symbols to narrate the stages of life and the periods of his career.
>
> In *False Start* (1959), he exploited a discordance between actual colors and the words that name them.
>
> Jackson Pollock
>
> Moon-woman. It is not easy to say what we are actually looking at: a face rises before us, vibrant with power, though perhaps the image does not benefit from labored explanations.
>
> Marcel Duchamp
>
> The Large Glass [The complete title: *The Bride Stripped Bare by her Bachelors, Even (The Large Glass)*] has been called a love machine, but it is actually a machine of suffering. Its upper and lower realms are separated from each other forever by a horizon designated as the "bride's clothes". The bride is hanging, perhaps from a rope, in an isolated cage, or crucified.
>
> Marcel Duchamp, in his own words:
>
> I threw the bottle rack and the urinal in their faces and now they admire them for their artistic beauty.

Note, that the interpretation is not outright clear to an uninformed viewer. Moreover, there can be many mutually incompatible interpretations because the art is ***abstract***. At best, the artwork and interpretation have something in common, but it may not be the case.

Not only my "art" is abstract; its subject is ***abstract:*** the keystone ideas of thermodynamics. An educated viewer could easily see my intentions and, probably, realize them in better pictures and animations.

It seems a paradox, but if we call abstract what cannot be perceived by senses, the abstract art may actually visualize and materialize an abstract subject : movement, suffering, struggle, boredom, and regularity.

It is a sacrilege to think that a viewer could improve the recognized titans of abstraction, but it seems so easy to paint another Piet Mondrian [this site contains interesting interpretations]. In fact, it is impossible. I see the greatness, if any, of such titans as Jasper Johns, Jackson Pollock, and Marcel Duchamp in their power of innovative performance. They were the first to use previously unthinkable techniques and tricks, and the value of novelty is something no epigone can duplicate. Novelty lives only a day. A bidet would not work after the urinal. (On the second thought, it could, but everybody would compare its author with Duchamp).

The typical rectangular Mondrian does not attract me in any way, and there could be a simple explanation of his style. I like his other paintings: flowers, and landscapes. There is always an abyss between a young and old artist, poet, and composer.

Animated electronic art is by no means a novelty, and this is why it is difficult to expect a titan there. It is possible to make money: the company named Electronic Art is successful even amidst the Great Market Plague of 2002.

I continue my explanations.

At high temperature the movement is highly chaotic. With time, any particle covers in its movement the entire area because it can be found anywhere. At low temperature, a certain order becomes visible: a particle is mostly confined to a relatively limited area in cells of a grid. The degree of this order or chaos is measured by the ratio of the area where the particle can be most probably found to the entire area, and this is done over all the particles. This requires a sufficiently ***long*** observation and does not tell us anything about the temperature because we ignore how fast the movement is, only what it is in the long run. On the contrary, the temperature can be determined by counting events during a relatively ***short*** time (see **Essay 14, On Taking Temperature with a Clock**).

An important area of mathematical physics—statistical mechanics—that takes a close quantitative look at the phenomenon of change in a system of changing particles. It is good for molecules and other simple objects, but of only limited use for describing human behavior. There is also a system theory, which is in the process of building, but of little promise, from my point of view. The problem with science is that as soon as an area of science develops, it immediately builds a stone wall of complexity separating itself from non-scientists. In addition, a moat filled with esoteric terminology further prevents a humanitarian tourist from entrance. But the major problem with scientific approach to society is that statistics requires a large (in time or numbers) system to generate a convincing truth (see **Essay 38, On Football**). We, as individuals, are not interested, however, in the society as a whole but only in our personal close environment, and only in the short run because in the long run we are dead. There is a general way of approaching partial problems of complex systems, but I still do not see how to put it into an Essay.

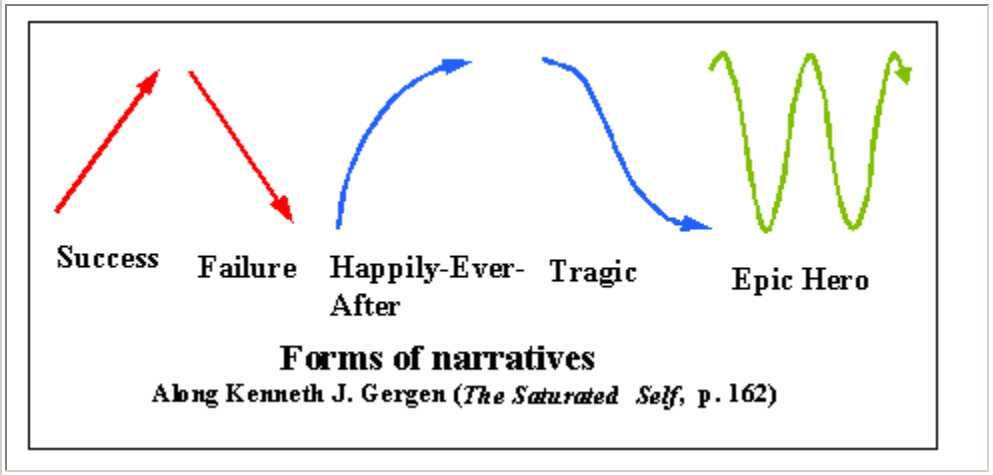
This is why I prefer to remain at the level of metaphor. Both physicists and humanitarians are trained in recognizing them by general education. A humanitarian can get some idea about main concepts of physics by just looking at the pictures accompanied with minimal comments. This also may help understand how a scientist can see beauty in the apparently deadly boring stuff .

I see the language of metaphor as the true common language of communication between sciences and humanities. I learned this language from poetry. I clearly see that many outstanding scientists (starting from Aristotle, see **Essay 37, On the Soul**) also speak the language of poetry. Unfortunately, the extreme rationality is as common among scientists as extreme irrationality is rare among artists: it is our reason, not madness, that brings home the bacon. Living side by side with Things, one cannot afford too much daydreaming.

The adventures of a **Sci-Phi Pilot** ← A unique, witty, and deep site of J.D. Casnig with a complete course of the **language of metaphors** and many ingenious texts and imaginative tests.

This remarkable site is now at http://knowgramming.com . See also Sci Phi Journal.

The following example illustrates how five "abstract paintings," showing nothing but arrows, metaphorically visualize five abstract types of stories, whether real or fictional. The arrows set the direction of time and the vertical axis is a measure of some evaluation, in this case, success.



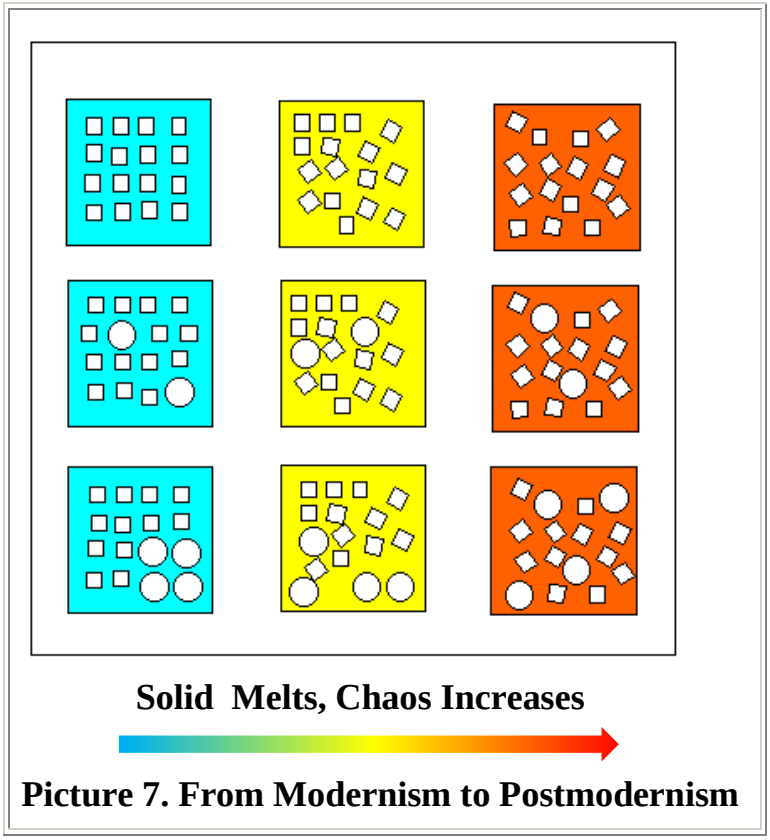
All fundamentals of mathematics and natural sciences provide a rich supply of metaphors. This cannot be said about the bulk of the sciences because only the fundamental ideas are not based on other ideas. To use the language of arts, they are defined in bold and irrational (i.e., non-logical) strokes of the brush and are always painted directly from nature.

An art critic, looking at my thermodynamic paintings, would draw some conclusions about the speed of change and its cohesion even without any familiarity with physics. One critic would say that the red changes faster than the blue. Another would object that the speed, if you measure it with a stop clock, is the same. Yet another would say that this is why the three pictures cannot portray the same object, but the fourth critic would say that we do not know what the artist mean: we see snapshots taken over equal times, but we have no idea what happens between the shots. Maybe, positions in the blue square change hundred times faster than in the red one. Art always stirs controversies.

That movement in a community of particles can be described in terms of entropy (level of chaos) and temperature (intensity of movement) is all we need to turn the table and apply our artificial physics to art and culture in general. This is an exercise neither in science nor in humanities but in exploring the border strip.

The visual metaphors of chaos, order, temperature, and motion fit the society consisting of complex individuals that change their desires and attitudes within some flexible limits, establish fleeting and stable contacts with other individuals, and exchange money, power, promise, praise, and offense. This is not a scientific theory but a metaphor of what is going on in both society and glass of water.

Here is my final picture, which reveals the message of the entire Essay:



Picture 7. From Modernism to Postmodernism

It is simply the mirror image of **Picture 1**.

I referred to postmodernism in **Essay 12, On Engines and Games.** Here I come back to the subject because of a highly stimulating and eloquent book, which I found by chance.

Kenneth J. Gergen, in *The Saturated Self: Dilemmas of Identity in Contemporary Life*, New York: Basic Books, 1991, painted a panoramic picture of the postmodern world that to me, in 2002, seems just a familiar display of eternal human nature.

Among other manifestations, the postmodern world displays:

1. Philosophy of the *anything goes* type where no point of view can dominate another, truth does not exist, and the objects are nothing but the way we use language. In practice, it is the habit of questioning everything by asking, "How do you know that it is so? It may be not." In other words, nothing makes sense, including the postmodernist culture itself.

2. Art without context and consistency, where the broken and fragmentary images (like in MTV videos) follow each other without any regularity.

3. The culture where an individual, connected by technology with the rest of the world, is constantly bombarded with events requiring response or imposing an opinion (travel, calls, conferences, visits, ads, media, professional information), so that the self dissolves and assumes a fluid form, opportunistically adapting to the next situation. The concept of personality loses sense, together with the concept of place where the person has roots in the ground.

I am not going to analyze or criticize the book, which I quote in the **APPENDIX**. I want to retell the story in a very different language.

The postmodernist philosophy of relativism is of no interest for me because it looks like a parody of epistemology, the part of philosophy concerned with our knowledge about the world. Of course, every philosophy is right. Otherwise there would be only one. I have a strong impression that postmodernist agnosticism is a retro revival of the old epistemological debates (some of the preceding the WW1 and the Russian Revolution), but with political implications. The politics in academia follow the same pattern as the split of the Soviet Empire and the wars in Africa, Sri Lanka, and the Balkans: more power per group, and, therefore, per a group elite.

Anyway, postmodernism (in my opinion, a storm in a glass of water), started from the arguments about language. Its first thesis was that there is no objective truth, only the way we use the language. Therefore, anything goes.

I am going to use a different and, as I believe, a more appropriate language for speaking about Everything: the visual metaphoric language of my self-made art.

We might argue about the chronology and classification of the recent historical periods as romantic, modern, and postmodern. I believe that the most recent evolutionary period, whatever we call it, started in the 60's, when science became an industry involving millions of people (**Essay 4, On New Overcoats**). I believe that it was part of a larger big evolutionary change known as the Industrial Evolution. It heralded the coming of the Things-making Things that consume mineral fuel.

I believe that the so-called postmodern culture and philosophy, which Kenneth Gergen attributes to the development of mass transportation and instant communication, is only a logical stage of the process that started at the end of the nineteenth century. As every revolution, it leaves most of life unchanged, but puts the area of change into the limelight. This is not, however, my subject.

I completely accept the thesis of Kenneth Gergen about the changing environment of the self, which in my notation is just a small square or rectangle in the social system full of motion.

After the above pictures, I have very little to say, and what I am saying sounds trivial to me.

Since the beginning of the Industrial Revolution, the **fluidity** and the **degree of chaos** (entropy) in Western societies have been increasing because of the softening of the rigid class structure and the increase of the rate of events, caused by technology. Both entropy and temperature have been rising. The latest factor that decreases the melting range is migration of people, balkanization and self-segregation, and the electronic procession and transfer of information.

This process can be measured and quantified in thermodynamic and pattern terms, if the thermodynamic paradigm is accepted. We produce enormous amount of statistical data that cannot be interpreted outside of a unifying concept.



The process of melting is very uneven over particular societies.

Like an ice cream cone, society melts on the surface.

This is where it is most visible.

NOTE (2016) . As a historical fatalist, I am not criticizing either postmodernism, or avant-garde art, or new social media and mores, or anything in culture. I want to understand all that as a natural process. In other Essays and pieces on spirospero.net I foresee the reversal of melting into social crystallization. So be it. I am out.

APPENDIX

1. From: Individual-Based Models , an annotated list of links by Craig Reynolds

Individual-based models are simulations based on the global consequences of local interactions of members of a population. These individuals might represent plants and animals in ecosystems, vehicles in traffic, people in crowds, or autonomous characters in animation and games. These models typically consist of an environment or framework in which the interactions occur and some number of individuals defined in terms of their behaviors (procedural rules) and characteristic parameters. In an individual-based model, the characteristics of each individual are tracked through time.

.....

Some individual-based models are also spatially explicit meaning that the individuals are associated with a location in geometrical space. Some spatially explicit individual-based models also exhibit mobility, where the individuals can move around their environment. This would be a natural model, for example, of an animal in an ecological simulation. Whereas plants in the same simulation would not be mobile. Some individual-based models are not spatially explicit, for example a simulation of a computer network might be based on individual models of the networked computers, but their location would be irrelevant.

2. I greatly admire *Slumber* by Janine Antoni:

> Slumber is a performance/installation: whenever it is shown, the artist lives in the gallery, weaving during the day and sleeping with an EEG machine recording her Rapid Eye Movement (REM) at night. The REM is an analogue to Antoni's dreams, and she weaves this pattern into the blanket that covers her bed while she sleeps. In this piece, an uneasy truce exists between contemporary medical technology, ancient myths of weaving and the mysterious world of dreams).

The description misses a fine detail: in the morning, the performer tears into strips her nightgown and uses the strips to weave the REM pattern. I find this beautiful, warm, and romantic.

3. At a very high temperature, liquid becomes gas, which means that the frequency of contacts with other particles increases, so that in a relatively short time, a particle, potentially, contacts all the other particles. Thus, before the invention of telephone, people had to walk around the neighborhood to talk to others face to face. Today, everybody is connected to everybody.

From the point of view of the generalized states of matter, the Internet was imagined by its prophets as information gas where the temperature (limited by the speed of

connection, but not distance and geography) is so high that, in terms of topology (**Essay 22, On Errors**), each wired individual is in the neighborhood of all the others.

Although the viscous liquid society, with the information technology, becomes more fluid, the idealistic picture of the Internet Age is far from reality. In fact, every particle is not only practically **aware** of only a tiny part of all the space, but cannot be "gaseous" in principle.

I constantly find amazing web sites of unimaginable quality and content. The world is anything but gas. It is a kind of slowly moving goo with fiber, crystals, and pockets of liquid inside—quite like live flesh.

Most people do not know about the existence of each other. A small group, however, for example, a small company, is, actually, a gas. In the thermodynamic sense, this human gas is the working body of an engine, as the steam in the steam engine. It is sucked into the company in the morning and ejected in the evening.

4. The mathematics of the systems where particles "feel" only their neighbors was generalized by **Stephen Wolfram** in his theory of cellular automata, although it was known before him that individual behavior can result in global regularities. Wolfram's "new kind of science" is a separate topic. I remember how deeply I was impressed by his first publications around 1980 and how sharp I felt their novelty. I believe that his general approach is genuinely new: it is a view on the world not from our knowledge about it but from the world itself. Thus, society is definitely a cellular automaton, which is not enough to understand it: Stephen Wolfram's paradigm is complementary to the classical science. The overall style of his work and its marketing is a harbinger of the times to come (we are half-way) when teaching and knowledge will be the private property of a completely gated community with a fee for a tour and a bottle of water. I would say that Stephen Wolfram is still incredibly generous at his unique and excellent site.

5. Quotations from *The Saturated Self* by Kenneth J. Gergen.

> The technological achievements of the past century have produced a radical shift in our exposure to each other. As a result of advances in radio, telephone, transportation, television, satellite transmission, computers, and more, we are exposed to an enormous barrage of social stimulation. Small and enduring communities, with a limited cast of significant others, are being replaced by a vast and ever-expanding array of relationships (p. x).

> With social saturation, the coherent circles of accord are demolished, and all beliefs thrown into question by one's exposure to multiple points of view (p. xi).

> Yet, as I shall argue, both the romantic and the modern beliefs about the self are falling into disuse, and the social arrangements that they support are eroding. This is largely a result of the forces of social saturation. Emerging technologies saturate us with the voices of humankind— both harmonious and alien. As we absorb their varied rhymes and reasons, they become part of us and we of them. Social saturation furnishes us with a multiplicity of incoherent and unrelated languages of the self. For everything we "know to be true" about ourselves, other voices within respond with doubt and even derision. This fragmentation of self-conceptions corresponds to a multiplicity of incoherent and disconnected relationships. These relationships pull us in myriad directions, inviting us to play such a variety of roles that the very concept of an "authentic self" with knowable characteristics recedes from view. The fully saturated self becomes no self at all (p. 6).

> Critical to my argument is the proposal that social saturation brings with it a general loss in our assumption of true and knowable selves. As we absorb multiple voices, we find that each "truth" is relativized by our simultaneous consciousness of compelling alternatives (p. 16).

6. A key to the understanding of MTV videos may be that they are abstract performances, akin to my animated pictures.

2002

Essay 40. Through the Dragonfly Eye

[animal vision, metaphor, Soviet system, Soviet life, Industrial growth, art, Industrial Revolution, evolution, the new, the eye of Horus, Robin Alott, Eric Weisstein, Stephen Wolfram, Principia Cybernetica, St. Isidore of Seville, Karl Marx, Frederick Engels, Joseph Stalin, Paul Avery, Dee Finney]

How to make sense of the world we live in? This question periodically arises when the ground under our feet seems cracking and the sky above falling. Such things do not happen every day, but when they do, the storm leaves piles of books on the intellectual shores, most of them empty, like dead shells, but some still closed, full of juice, and waiting for the high tide to be returned to the sea. The storm can be only in our imagination—whether in a vast ocean or just in a glass of water. The books tried to make sense of it.

First of all, we have to look at the world, but how?



Mechanisms of vision can differ greatly. The vertebrates have an eye with a single lens and a large number of light-sensitive cells in the retina, while the insects have compound eyes built of thousands of separate primitive eyes (ommatidia), each with its own lens and a few sensitive cells. Cephalopods (for example, octopus) have an eye with a rectangular pupil and a system of focusing, actually, identical with that of photo camera, so that the octopus would never need eyeglasses. Doesn't it look a far stretch: world's persistent questions and the eye anatomy of remote species?

The insect eye inspired the following sophisticated metaphor:

> The mosaic eye of the dragonfly has 28000 ommatidia, 28000 micro-eyes. Throughout humanity we have thousands of millions of eyes looking out on the single world, the single universe. The integrating processes, which in the insect are the result of the organization of its nervous system, are constituted for humans by the development of language, language as a system for externalizing the contents of each individual's brain and, with the invention of writing, enabling information to be transmitted over time as well as over space.
>
> Robin Allott **THE ROLE OF LANGUAGE - THE GREAT MOSAIC EYE**

Sciences and humanities use the same words but speak different languages. With different religions and tribal cultures, they feebly resist the advancing integration. I believe they can communicate through pictures on sand, body movements, finger signs, and facial expressions, as it is done between linguistic strangers, and I am not alone.(See APPENDIX 1)

In a mood for another metaphor, I am tempted to say that these Essays are an unfinished map of an archipelago. The names of some major islands are:

> Chaos-Order, Temperature, Energy, Work, Space, Set, Thing, Idea, Human, Science, Art, Probability, Pattern, Evolution, and Competition.

My metaphor of archipelago is bleak and no match to the brilliant metaphor of the insect eye. It seems that "archipelago" is just a fancy term for **set** (see **APPENDIX 2**). My metaphor is a pattern formula for anything that consists of several individual but complex objects, the spatial relation of which does not matter. We can call the table with plates and dishes of food an archipelago. What the fancy term adds to the concept of set is the idea of travel: one can travel from island to island, i.e., object to object, explore each island separately because they are not just points in space, and keep the travel diary. We can do the same with the brunch table. There is, probably, something else in the very sound and appearance of the Greek word (which means "chief sea" and not islands) that draws irrational word hunters to it, as a web search would show. The geographical metaphor is so trite exactly because of its magic appeal: *The Goulag Archipelago...*

What else the image of an island invokes is the shore: a one-dimensional object on a two-dimensional surface, which is, at a closer look, a two-dimensional stripe, full of movement and change, which equally belongs to land and water. The dinner plate rim is of no interest to the gourmet.

I pick up some of the books and web sites, seemingly with the vital juices that have an aphrodisiacal effect on my imagination. I enjoy finding them by accident, long after the turbulence of time that generated them had subsided and a new tide washed them out of sight. I like the beauty of Everything, which cannot be seen from a narrow crevice of specialization. Art or science—the world is one.

The question about "the world we live in" is nothing but rhetorical because of the pronoun "we." I know only myself and other people may see things differently. What makes sense to me may not make sense to them, and *vice versa*.

Unlike an academic who is supposed to know all the literature in a certain professional area and around its borders, I am a dreamer walking along the intellectual beach where land and water overlap in a narrow stripe. It is impossible for me to read all the literature because the protagonist of my dreams is Everything. I want not knowledge but

understanding, the process and not the result. I have a view of the world that I believe only few other people can have because only a few odd dreamers can be interested in Everything. Moreover, as if to prove the futility of mixing up reality and dreams, I am interested in the future that I will never see.

In order to make sense of the world we live in, we need a paradigm: a familiar and understandable **way of vision** that applies to the new situation. Whatever we look at, we first check it with our records: is it new or old? We need to see the new in the light of the old, and as soon as we label it as new and file it in, it becomes old. Next, we need to find the right drawer in the file cabinets of knowledge to place it.

Evolution is the new content of the old *drawers* (not a good term, but see **Essay 32. The Split**). This appears to be an irrational twist. The new, by definition, is something that has never existed before. True, but the old drawer for it could be found. If there were no mechanism allowing for understanding the new, the world would be as full of mysteries as it was for an ancient human before the gods were invented. We understand the new by rummaging in our dusty cabinets, but then we put a new file into the same catalog: a new criminal in the same aggravated murder assault drawer in the murder cabinet. The history of major scientific discoveries—and for that matter, any history—is a rich record of how the new hatches from the old.

The secret of the birth of the new is that the new makes one step at a time, and all the steps can be expressed in old terms of the language. Looking back, we see a long jump.

I conclude the first part of my Essays with my latest discovery, which came unexpectedly to myself. It was a sudden change of the vision: I looked through a different *ommatidium*.

I see the current stage of history as a logical continuation of the transformation of human society into a society where the Things use humans as enzymes for their metabolism. Instead of retelling **Essay 6, On the Yahoos, or Apologia of Samuel Butler**, I will share my recent sudden realization: I lived in a prototype of such system for 50 years of my life.

The Soviet System is usually presented as cruel, oppressive, and inhuman, which *per se* is not such a rare exception in the world. There are many dictatorships that fit the same pattern. People can adapt to anything, and the Soviet people could be as happy as their American counterparts, and for similar reasons, although on different scales. It was a dull but working system, with free education, health care, state-supported theaters and symphonic orchestras, and libraries that stored a lot of officially denounced knowledge. What was so different and unique about the Soviet system?

The Soviet life was completely subordinated to one overriding goal: production of food, coal, steel, machinery, and weaponry. The entire giant country was a single enterprise or,

rather, feudal manor that had no owner. It was managed by an oligarchy, non-hereditary, non-elected, but self-perpetuated, like mafia.

For those who never lived under Communism, it is difficult to imagine that not only the industrial and agricultural production, but also education, ideology, art, TV, and even Communist theory were all tightly assembled into a giant production machine. The fulfillment of government production quotas ("plans") had the absolute priority. The humans were just parts of the mechanism and they were taken care of better than under most dictatorships.

The goal of foreign policy was to ensure security of production. Stalin's terror resulted not only in the elimination of political opposition, but also in creating a huge prison workforce for timber, gold, and construction industry in scarcely populated regions. Happy life was productive life. The sense of life fulfillment was expected to come from meeting the quotas and pledges at the workplace. The meaning of life of a coal miner and a ballerina was to contribute to the growth of production.

I believe that even the liquidation of private property, the most radical evolutionary distinction of Soviet Communism, was aimed at a complete conversion of an individual into a unit of a metabolic web.

On June 25, 1945, at a reception in the Kremlin on the occasion of the victory in WW2, Stalin proposed a toast to the Soviet people who were “the little screws of the great mechanism of the state.” This idea has never died on the Russian soil. As Dmitri Yudin, the author of the Russian NewsOnLine site (link died) , from which I quote Stalin's toast, writes, "I meet every day people whose dream is to become such little screws." See **APPENDIX 3**.

Most of the space in the standard four-page Soviet newspaper, completely controlled by the state ideologues, was devoted to successes and failures of production. There were no sensations and the Party leader was the only celebrity, although with no access to his private life. There was no advertising, except for the job ads in local newspapers: there was always a lack of hands at the factories. Work was life and life was work. All salaries, however, were fixed. Only a small bonus was allowed for workers.

The Soviet work madness came from Karl Marx, who proclaimed the mode of production to be the prime defining factor of all social life, and, probably, for a good reason. With all my allergy and resentment to Marxism, I cannot argue with that. The main folly of Marx was that private property limited production and needed to be ... what? Marx was very vague on the subject of an alternative. He was firm on the expropriation of capitalists, however.

The mechanism had to be solid, and so any fluidity of society was prevented, including free choice of the place of residence. The Soviet citizens needed a residence permit. It was not given unless there were available dwelling and work. The dwelling and work were not permitted without residence permit. To avoid work was a crime of parasitism.

Joseph Brodsky was trialed and sentenced (the transcript of the trial is very much worth looking into) to exile for that reason.

It was an experiment in realization of the society of Things not just because the production and work quotas were in the absolute focus of government policy and daily news (the accidents, crime, and natural disasters were not) but because the ideal humans were supposed to exist like the Things they served. The art that did not mobilized the workers to produce more and better was bourgeois. The cities were split into categories of food and goods supply, as different as the landscapes of the jungle and the desert. Poverty was imposed on the people in order to prevent the accumulation of money and, therefore, relative independence of the state. Of course, the people were told that they were the happiest and luckiest on earth, and my impression was that the vast majority were grudgingly satisfied.

The human nature, driven by the brain cells filled with liquid protoplasm and not silicone crystals, was a bad material for a machine controlled by a single hand.

When the money started to accumulate in the pockets of the criminals and ruling elite, the Soviet system collapsed.

An inquisitive and stubborn youth, growing in such atmosphere and being a voracious reader of books written outside the workers' paradise, I fell under the lifelong influence of Montaigne and Lucretius who persuaded me of my inborn right to have my own judgment on any subject and on all of them.

Today, in a diametrically opposed world, animated with the same human nature, in spite of all my historical fatalism, it gives me irrational creeps, it gives me creeps to see the familiar specter of society subordinated to the overwhelming goal of growing production. The specter, sublimated from the fire and smoke of the first steel mills of Industrial Revolution, is still haunting the globe, this time in Victoria Secret's lingerie, embraced by all powers of Europe.

> "A specter is haunting Europe--the specter of communism. All the powers of old Europe have entered into a holy alliance to exorcise this specter: Pope and Czar, Metternich and Guizot, French Radicals and German police spies. " Communist Manifesto, by Karl Marx and Frederick Engels.

The ideology of Communism, therefore, was only a derivative of the ideology of production. It is a very unsettling idea.

The Soviet industrial machine was a lousy, inefficient, and bleak prototype of the future, a macabre toy of evolution. Its very poverty, however, was a solution for a scenario of depleted resources of energy.

Heavy, fleshy, vulnerable, gluttonous, hedonistic humans, who need food and water, have no chance in competition with the chips subsisting on solar energy, even if they engage in

sex from dawn to dusk, clone themselves by hundreds, and combine it with watching the silicone entertainment. The billions will have to die, like the billions of acorns falling from the oak trees, of hunger, thirst, and war: before the birth.

The Pandora box of industrial growth, to which we owe our freedom, wealth, and comfort, seems to be one of a few (if not the only one) really new, new evolutionary drawers. In fact, it is part of a more general drawer of biological growth. Life is growth through replication and it leads to competition, and competition leads to evolution. A population or a large taxonomic unit (species, genus, family) may survive for a long time because it is not a single organism. A tightly built social mechanism with only one brain, heart, and blood circulation is doomed as any single organism. This is why the **single** Soviet social organism died, spilling its genes into a pile of rusty but enthusiastic little screws.

As soon as we have one system, its fate is death. Death is the thermodynamic corollary of uniqueness. Anything that exists in one copy, like ourselves, is sentenced to death by the laws of nature. This is why all empires die. This is why death is embedded in the genetic code of anything global and super. I would even predict that as long as there is one Internet, it will be dying by drowning in the sewage of spam and viruses. This is what private property is about: it keeps society alive by fences and dams. The Internet will split into gated communities and the inner city and the Web will not be free. We already see it happening.

The freedom of choosing a button on a menu is not really freedom, but this is the natural course of things. The alternative of the natural course of things is the virtual course of things, and the alternative of both of them is the artificial course of things.

But I am carried away. I am slipping into the doom and gloom harangues, which I hate. A fatalist must be cool.

Anyway, how can be the frozen, rigid, oppressed, and poor Soviet Union put side by side with the free, dynamic, fluid, and affluent America?

I would never see my Soviet past in this kind of light and would never connect it to my present life, if I did not use a different kind of vision: through the pattern eye. Whether I look at it with pattern eye or the eye of a dragonfly, octopus, or the (
← **red**) Eye of Horus, I do not see any alternative, however.

As Rip van Winkle, I missed about ten years of modern American history when I came from Russia. The older history was rather well reflected in the Soviet sources, including such episodes as the release of *The Godfather*: there was a decent review, but not the movie itself. Instead, I have been watching, fascinated, the next fifteen years of the New World, from the end of the Reagan era to the advent of Internet, and to the collapse of the technology bubble. I have a strong impression of a massive tectonic change in the American society. It is the offense of corporate ideology on individualism. I have lost a good deal of my belief in the power of individualism.

In the absence of an open frontier, the lonely hero of the westerns becomes a sci-fi rider of nonexistent worlds. Neverteless, I can see that an individual, even with trimmed power, can still survive and find peace of mind in this society, without clinging to a bunch, wearing a secret uniform, and breeding numbers.



While the power of numbers against the one is growing, what exists in one copy is art. Is that a countercurrent? See **APPENDIX 4.**

Thank God, I can still end with a question mark:

How to make sense of the world we live in?

I started these Essays as purely personal experiment in the art of poetry. I see them now as an experiment in hot air balloon flying over the Archipelago of Everything. Pun intended. I have a sense of losing myself and becoming a kind of enzyme, pannomerase. This is why I take a break.

APPENDIX

1.

The concepts of **Set** and **Energy** are in the very foundation of our understanding of Everything. They deserve separate Essays. For in-depth **Set** , see in Stephen Wolfram's wonderful **MathWorld**, part of Eric Weisstein's **ScienceWorld** that remains connected to the real world of non-mathematicians and is, actually, created for them. Like Aristotle (**Essay 37, On the Soul**), Eric Weisstein and his colleagues call for illustration and metaphor in difficult cases of fundamental ideas, see, for example, the poetic and crystal-clear **Manifold** (author: Todd Rowland). Weissteisn's goal is a larger project "to collect and make available detailed mathematical and scientific information in a way most accessible to lay people." **ScienceWorld** includes also chemistry, astronomy, and biography.

A great and necessary complementary site is Principia Cybernetica. It "tries to tackle age-old philosophical questions with the help of the most recent cybernetic theories and technologies." It includes DICTIONARY.

It looks like another archipelago is taking shape: The Everything Islands. Here are some islands of the Humanity group:

Perceus Project Project Gutenberg

There are much more minor islands and rocks emerging from the water of oblivion. For example: Isidore-of-Seville .

St. Isidore of Seville, ~560-636, was the author of *Etymologiae*, the early Medieval encyclopedia, surprisingly comprehensive. Here are the contents of eight out of twenty volumes of his amazing work:

book four, treats of medicine and libraries;
book five, of law and chronology;
book nine, of languages, peoples, kingdoms, and official titles;
book eleven, of man;
book twelve, of beasts and birds;
book thirteen, of the world and its parts;
book sixteen, of stones and metals;
book twenty, of victuals, domestic and agricultural tools, and furniture.

> St. Isidore of Seville was an official candidate for patron of computer users, programmers, and the Internet.

"Everything" is not a good term, but I cannot find anything else. The best sounding word is **Minden**: the Hungarian for Everything. Hebrew **Olam** is not bad either. Is **Pannomia** (or **Pannomy**) correctly derived from Greek as the term for the knowledge of Everything? By the way, Pannonia or Pannomia was a Roman province, now Hungary.

2. From the same Russian source:

On August 16, 1941, Stalin, Zhukov, and other commanders of the Army Headquarters issued Order No 270. The Order implied that "the [Soviet] troops taken prisoners are malicious deserters and their families must be arrested as the families of the deserters who violated the Military Oath and betrayed their Motherland."

The history of Communism is an incredibly shocking record of horror stories. So was the history of the early Industrial Revolution.

The following is a quotation from Frederick Engels' (Karl Marx's friend and co-founder of Marxism) 's The Condition of the Working Class in England (1845). Chapter 8: Single Branches of Industry.

> Lord Ashley repeats the testimony of several workwomen:
>
> "M. H., twenty years old, has two children, the youngest a baby that is tended by the other, a little older. The mother goes to the mill shortly after five o'clock in the morning, and comes home at eight at night; all day the milk pours from her breasts, so that her clothing drips with it." "H. W. has three children, goes away

> Monday morning at five o'clock, and comes back Saturday evening; has so much to do for the children then that she cannot get to bed before three o'clock in the morning; often wet through to the skin, and obliged to work in that state." She said: "My breasts have given me the most frightful pain, and I have been dripping wet with milk."
>
> The use of narcotics to keep the children still is fostered by this infamous system, and has reached a great extent in the factory districts.

3. Again, what is art? Anything that is useless but made with love. I am only half-serious. The serious part is that this is why people love art. For the same reason, before the twentieth century, most scientists loved science. People like to make love.

The knowledge of animal vision is narrow science that is of no use for the absolute majority of people. I consider it art, therefore. Here are some interesting *love-made* sites about vision.

What about an insect and a human? (this is a page in a remarkable, for the travelers of my archipelago, site of Paul Avery).

What is the Eye of Horus? See the site of Dee Finney, which is an example of Web art made with love, even if you hate mysticism.

2002

Essay 41. The Morning-after Questions

After a four year long break I am returning to my Essays at ***simplicity***.

Why simplicity?

First, I turn to simplicity to counterbalance ***complexity*** **,** which is a look at the world from a distance, with a view of the world from within.

We see a lot from a distance and this is why the picture is complex like an epic novel or a diorama of a major battle. From the inside we see only our immediate surroundings, we care about what we can touch or what can touch us and this is why we believe our bubble world is simple and within our power.

The art of complexification—turning simple into complex—might be useful for a scientific publication, writing a book, defeating an opponent, or submitting a Ph.D. dissertation. The art of simplification is what we need in order to navigate outside the bubble in the world which is always complex.

For a chemist like myself it is habitual to reconcile both arts by understanding a complex structure as a configuration of simpler blocks, as well as by building a complex structure from simpler units and by simple steps. In this sense a child playing with Lego, an architect, and the author of an epic novel are chemists.

In ***complexity*** I have been fixated on the subject that usually evades social sciences: the speed of concurrent processes. We all know what can happen. But when? This is the question behind "to be or not to be." The fastest process brings about one of several possible alternatives. What can speed up one process, leaving the rest at the same speed, is called catalyst in chemistry. My main interest has been catalysis in history. If a catchword for the chemical way to look at complexity is needed, here it is: **chemplexity**.

Complexity is about a few enduring things. Simplicity is about many transient ones. The enduring things need the least of our attention, while we are dealing with the fleeting ones which come and go unannounced.

There is, however, one enduring thing that I am preoccupied with: democracy. It needs participation of voters who must understand complex issues. Until the issues are too complex to understand, democracy is not what it is meant to be. The voting procedure decides the fate of the country not only at the national elections, but also at the Congress,

numerous commissions, and at the courts, when the fate of an individual or a group is at stake. Even without a formal procedure, innumerable councils shape decisions just by an exchange of opinions. Remarkably, the scientists whose trade is to understand complex and controversial subjects do not vote on what is right and what is wrong: they believe in truth and its understanding.

I believe that the growing complexity of important subjects is the major threat to the very concept of democracy. From now on, a fabricated simplicity can become the cheerful face of complexity for the major force of democracy: the people who rise their heads from the transient but all-consuming personal problems and pleasures of the day.

The enduring things last long but not forever. We may not be able to change the natural course of evolution, but at least we might be able to understand what we are doing.

Second, I turn to simplicity to look for the simplest reasons for what I perceive as curious, puzzling, or disturbing phenomena and events.

The major and at once curious, puzzling, and disturbing phenomenon of the post-9/11 time has been the presidency of George W. Bush that began in 2001. To call it Bush era or W-era would be a great exaggeration of the President's personal role. I do not believe the President can be personally blamed for everything that happened. For a preliminary guess, see **APPENDIX 2**.

Depression? War? Confusion? Failure? Loss of prestige? Alienation? Division? Trouble? Mess? Obscurantism? Corruption? Stupidity? None of those words can describe the current period as something that has never happened before.

I prefer to call the W years the **Cold Civil War** (CCW) because this is where I see its novelty. "CCW" is not my invention, although I came to it independently. The term can be googled on the Web.

For me, with my Russian past, war has a very special and ominous connotation. Since about 1830 and until the collapse of the Russian-Soviet Empire, a succession of outstanding observers of Russia (from the Marquis de Custine to Soviet dissidents) repeatedly described the Russian autocratic way of life as the permanent martial law accompanying the war of the government on its own people.

The question I ask myself is whether the ugly war of two political parties in America is—or may become—**a war of the government on a half of its own people**. The word **revolution** (as in *Republican Revolution*) sounds especially troubling to my Russian ear because the Soviet totalitarian system was the conscious goal and result of the Bolshevik Revolution. When I hear the "war on the middle class" call to arms on TV, or a listener's (without a trace of foreign accent) question "are we already in a totalitarian society?" on the radio, I am unable to take the entire situation lightly and to keep my questions for myself.

In other words, how **stable** is the American system in the changing world? This is the question that nobody can answer because explanations in history come always *post factum*.

I ask my questions as a concerned citizen, but I answer them as a chemist. In chemistry the notion of stability is the very essence of chemical prediction. While trying to predict the future of human relationships, we distinguish between good and bad chemistry. The unstable systems and unions fall apart. The stable ones lose stability.

> If Austria-Hungary was stable but weak, Russia was strong but unstable. (Niall Ferguson, *The War of the World: Twentieth-Century Conflict and the Descent of the West*, The Penguin Press, New York, 2006, p.13.)

What are the most general factors of stability in the fate of the nations? This is the question I am most interested in as a chemist looking at a larger world.

Asking myself this and other similar questions, I realize that there is no science that could answer them. The good hard grant-earning science deals with what was true last year (only we did not know about it) and will be true next year (and now we know). We, however, are seeking answers that made no sense the day before yesterday and will be out of date the day after tomorrow. Those are **the morning-after questions**. Unless an action is taken while the question is still reverberating, the answer will be of no importance.

What we can do without the Pill for the impregnated history is to ask the questions again and again and just believe in understanding that may come one day—and elude us the day after.

I am dividing this Essay into two sections. I intend to write the second one after the next elections, in 2008 or later, giving myself at least two years to think it all over and to see what happens next, if anything at all.

> [**NOTE.** November 9, 2006. See **APPENDIX 5**]
>
> On simple reasons, see: Essay28.html and its compact version Simple Reasons.

APPENDIX

1. This is June-July, 2006, the year of the FIFA World Soccer Cup. Modern soccer, like modern history, is global, runs without time-outs, and is about speed and waiting, long-distance interaction and close range struggle, quick thinking and automatism, fine technique and crude willpower. Like history, it splits into episodes ending in triumph, failure, or, most of the time, nothing at all. Hannah Arendt's remark about the "frailty of

human affairs" (*The Human Condition*) came to my mind while I was watching the games. I thought about the difference between soccer and political life. Both have the same "futility, boundlessness, and uncertainty of outcome" that Hannah Arendt attributed to action, but US politics is a game played, like chess, by a political machine against another such machine, while soccer is still played by men against men. We, wired far apart, entrenched behind firewalls, are today the opposite of the Greek *polis*, which was the point of reference for Hannah Arendt. If there is anything still connecting us with the time when history was played by humans against humans, it is soccer, with its minimal gear, average physique, and constrained commercials on TV. What could remain after the games is that, in Hannah Arendt's words, "the least tangible and most ephemeral of man-made 'products,' the deeds and stories which are their outcome, would become imperishable." By the standards of the supermarket, of course.

2. What is Arendt's "boundlessness?"

> Thus action and reaction among men never move in a closed circle and can never be reliably confined to two partners. This boundlessness is characteristic not of political action alone, in the narrower sense of the word, as though the boundlessness of human interrelatedness were only the result of the boundless multitude of people involved, which could be escaped by resigning oneself to action within a limited, graspable framework of circumstances; the smallest act in the most limited circumstances bears the seed of the same boundlessness, because one deed, and sometimes one word, suffices to change every constellation. (Hannah Arendt, *On Human Condition*, Chapter 27, *The Frailty of Human Affairs*).

It is remarkable how a very small circle of people can involve the whole world into a dramatic conflict. The Islamic terrorist revolution was initiated by a small group with little resources. The tragic aspect of the American response was that a small and secretive group of people with huge resources and little imagination was in charge of the counteraction. The enthusiasm of a very small group of smart people with little money but big imagination had initiated the revolution that brought to power the small and secretive group... but let us think more on all of that.

3. Henry Kissinger (politics) and Jeffrey Toobin (law), who are among the most intelligent men of our time, are soccer fans.

4. See **FIFA 2002 World Cup in Essay 38, On Football** . Of course, by football I mean soccer.

5. I am adding this after the midterm elections of 2006. The fall of the Republicans, which, as Katrina vanden Heuvel (Editor, *The Nation*) said, saved the constitutional foundations of American democracy, is a great relief from the long dark night of the Republican Revolution. I still have to wait until 2008 to summarize. Meanwhile, I ask myself some new morning-after questions.

5-1. Are the constitutional foundations of American democracy safe if they need to be saved?

5-2. During the Republican night America did economically pretty well within its border. Do we need to worry so much about who is the pilot if there seems to be a kind of autopilot?

Tentative answer:

The autopilot of popular vote was OK when America was riding horses and even trains and automobiles, but at the high speed of electronic postmodernity the equine or gasoline autopilot may not be fast enough.

Meanwhile, I have made a discovery.

Throughout history nations used to conquer and expropriate other nations. The most original and heretic idea that Marx brought into this world was expropriation of the rich of the native country. That was a terrible aberration of thought! Instead, the rich could be used to support the *de facto* one-party system that Lenin launched after the Russian Revolution. Alas, after the revolution there were no rich anymore and the *de jure* one-party system was maintained by the only remaining means: terror. It seems to me that in both modern China and Russia—two giant survivors of extreme red fever—the cliques of people in power who had studied Marxism at school made the same discovery.

Ideas do not know borders and do not die. The next Karl Rove and Ken Mehlman are probably still in the elementary school. The Next George W. Bush is contemplating the Harvard Business School. But the question remains: how stable are the one-party and the two-party systems? And how strong are they?

2006

Postscript (June 10, 2009) . I intended to return to the Grand Elections of 2008. Now they are behind me and have not a slightest desire to come back to them.

Essay 42. Credentials and Credo

Intending to focus on politics in a few next essays, I feel powerless to prevent another confessional Essay from hatching.

My interest in politics is non-political. I am driven by intellectual curiosity to intimate mechanisms of evolution and human history. It all comes from my childhood interest in the hidden reasons of things.

I am politically unaffiliated. I am not a liberal. I am not a conservative. I am not in the middle. I am not at any extreme. The ideology, methods, and the Party-of-God style of Republicans, however, trouble me very much. My Democratic sympathies are strong by default because the Republican ones are nonexistent.

I voted for George W. Bush the first time and considered him a great national embarrassment the second time. Moreover, I believe the midterm elections of 2006 signaled a kind of political autoimmune disease when the nation slides toward slow self-destruction by attacking its own flesh and blood.

I have not yet studied the anatomy of American political system, and I expect no pleasure in that, but I know that its blood is green.

Politics is in the air, on the table, in the gas tank, in the wallet, and under the skin. I am not interested, however, in what can be seen and felt. I do not go into details of dates, names, facts, and sequences of events. The Web has it all. I am interested in the yet invisible new trends of history and deeply buried fundamentals.

I do not know the answers in advance. I do not even believe in answers. I believe in asking questions because questions lead to understanding and I believe in understanding more than in knowledge.

I see politics as a class of X-systems (X = ECS = Evolving Complex Systems, *exystems*). X-systems usually start from simple and small formations and gradually achieve a great size, complexity, and sophistication. Examples are: biosphere, life, mind, society, economy, technology, science, culture, art, media, language, ideology, i.e., everything from molecules to ideas, or, in terms of outer limits, from biosphere to noosphere (sphere of reason). Any X-system requires a not only a constant supply of energy convertible into work but also a cool environment absorbing the dissipated heat. The largest X-system

includes everything between the upper crust and upper atmosphere, with eyes and tentacles turned toward space. The rest of them are nested, interwoven, and overlapping.

CREDIBILITY

There is very little new I can tell, if anything at all. I am not an expert in humanities. I do not claim any credibility in those matters. I am certainly not a source of any hard scientific knowledge. The only thing I really want to contribute is a chemist's view of the world, which, I believe, is significantly off the beaten track. My world starts with molecules. It is the world of structural complexity where I am looking for simplicity.

For a chemist's view of the world, see http://spirospero.net

CREDENTIALS

I am not a historian. My profession—chemistry—is far removed from humanities, my lay knowledge of American history is inadequate, and my American experience has been very limited: nineteen and a half years, to be exact. True, I have read selected books on modern problems. I have been a reader, listener, and viewer of a few magazines, programs, and shows still struggling to hold the head above the rising water of mediocrity by surrendering to the flow the rest of the body.

If my background has any advantage in that can compensate for my limited knowledge and experience it is that my life in the Soviet Russia could be described in exactly the same terms as my American life: as *vita contemplativa*, contemplative life, although with some elements of *vita activa* (I use Hannah Arendt's distinction) at the end. Most of it was spent in trying to understand my native land as if it were a foreign world.

In Russia, even some most important and mentioned in school textbooks sources for studying national history were under the lock in secret storage rooms and had to be tricked out through friendly librarians or just fished out from translations, footnotes, commentaries, or, most often, from between the lines. Therefore, my observation point has always been neither from within nor from without, but through a peculiar vision of an alien who came from an extinct world. Remarkably, I, an alien, immediately felt at home in the new world.

The Soviet Russian world ceased to exist for me in 1989, when I crossed its border for the first and the last time. A few years later it ceased to exist for everybody. Kiev, the place of birth of Russia, is now outside Russian borders. Only the emigrants still carry the original memories not overlaid by the subsequent impressions. The memories of immigrants who do not come back for a visit have the value of photographs from the Stone Age made with a modern camera.

Advancing in age, I found two unexpected gifts waiting for the moment I would reach sufficient maturity: grandchildren and the sense of the past. It turns out that every old person is rewarded for the loss of physical and mental capacity—loss of the future—with the raw physical sense of history, although not everybody claims the reward. My personal

gift package encloses a long stretch from the pre-WW2 early childhood, first German bombardments of the war, life as refugees, return home, to Stalin's cult and death, and further to the Cold War and subsequent break-up of the Soviet Empire.

My experience of history is multi-dimensional. I traversed Russia along and across, from the extreme west on the Hungarian border to the farthest Pacific coast and from the Polar Circle to the deep south, not far from Afghanistan. I lived in the warm Ukraine and cold Siberia. Moreover, I explored Russia in the fourth—social—dimension, descending from a university professor to a prisoner of a labor camp. Finally, I crossed the border between two worlds: totalitarian state and capitalist democracy. That was the fifth dimension: the lineup of civilizations.

In America, the two spatial dimensions—from Boston to San Francisco and from Chicago to New Orleans presented no eye opener. The time span from the last year of Ronald Reagan to the full blown Cold Civil War, intertwined with the hot Iraq war, looks like a leap backwards from the Moon landing to the burning of Atlanta by general Sherman. My social dimension in America turned out to be very compact: between employment and unemployment. The last dimension—along the wealth scale—remains uncharted. But the nineteen years of my American life seem longer than the half century of my Russian past. This life is extremely dynamic and my coming to America at the age of 50 was like a second childhood: the time was packed tight with discoveries and weeks seemed endless.

What we see can be masked or enhanced by the background. Black against black or white against white is invisible. Black and white are the colors of the printed page intended for fast reading. My personal vision retrieves the Soviet red background only when I see the indigenous American Red. Paradoxically, it makes the American Red most visible against the now archived but still glowing in my memory Russian red. I am over-bullish on red. See, however, my credo.

CREDO

1. I believe that societies have a **limited repertoire of stable political structures** (patterns) and are capable of transition from one to another, depending on conditions. The transition consists in the change of the types of **building blocks**, their weight, and the way they are arranged. When **new blocks** appear (for example, digitalization), **new** structures are possible. When **new arrangement of old** blocks appears, a **different** structure comes to existence.

> This is a very chemical idea because chemistry is a science of transition from one stable structure to another through an unstable one.
>
> Chemistry is a natural science never designed for any other use than handling atoms and molecules. But Pattern Theory (Ulf Grenander) in the eyes of a chemist like myself is a generalized chemistry applicable to practically everything, from molecules to organisms and from machines to ideas.

For an incomplete collection of details of this approach, see complexity. My Essays at simplicity are full of illustrations.

2. I believe that history consists of unexpected turns. The future has a nasty habit to lie in wait around the corner.

Hannah Arendt remarks in a letter to Martin Heidegger that the futurologists see the future as extended past, while it is always the opposite. There is some asymmetry of good and bad: we always know what is good for us, but the bad can take unfamiliar forms. Probably, this is a basis for the divergence between conservatives and liberals. Nevertheless, there could be pleasant surprises, usually short-living: mad money at the stock market nearing 2002, extraordinary low interest rate by 2004, or incredible around $1 gasoline price in 1999. As recent history shows, the only thing we have to fear is pleasant surprises.

3. I believe that the future cannot be predicted, but could be examined for likelihood as an incomplete list of alternatives.

For example, I either die tomorrow or not. If I die tomorrow, it can be either in an accident or of heart attack. To compile a tree of alternatives, we need a combinatorial representation of the future, for which a complete list of components is needed. This is not so hard. For example, if I forget the alternative of a death by a stray bullet, its likelihood (i.e., its weight in the balance of the future) is negligible. If, however, a **new** combinatorial component appears as a new social or technological phenomenon, the yesterday's list of alternatives becomes incomplete. The problem with the new phenomenon, such as, for example, global warming, Internet, or suicidal terrorism, is that some time is required to evaluate its weight. By that time the new becomes the old, as it is the case with mixing the matter of politics with antimatter of religious faith on the present scale.

What matters for understanding the future is the rarest and largest events, not the small ones. Whether I die of a heart attack at home or on the street does not matter. Fortunately, there is a practical rule: is something is really really really new, you can be sure it is important.

4. The generation after a historical turn never misses what it does not personally remember. Who today bemoans the fall of the Roman Empire?

This acceptance of **the natural death of the past** is my kind of fatalism. It has nothing to do with historical determinism. It means acceptance of any future because it is destined to die as a past. If we accept our death, we can accept the death of the habituated way of life. I see it as an optimistic fatalism: a belief in survival and adaptation, but not in personal or collective victory, success, and

triumph over adversity. "If you really want it, you can do anything" is the biggest well-intended lie that can be told to a young person. In America, however, a young person can do a lot.

Civilizations are destined to be born, age, die and to be reborn. We need courage to live and to face history.

5. "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness."

I am not sure that Liberty is a natural right, except as the freedom from physical restraint. I believe that there are only partial freedoms and nobody is completely free. Life, Liberty, and pursuit of Happiness are basic human **needs**. As part of nature, we do not have rights: we have needs. Society cannot change our needs, but can manipulate our rights.

Successful democracy is geographically, historically, and biologically such a rare and fragile thing that it needs a constant maintenance, checkup, and care. It can be preserved only at a great price in the currency of physical and intellectual energy, as well as of human sacrifice. As the daily food has to be eaten by the sweat of your brow, you liberty has to be earned by daily toil. For millennia, the natural state of things on earth has been war, conflict, domination, submission, contrasts of wealth and poverty, peck order, control, cruelty, intolerance, selfishness, and a hierarchy of power with a ruler at the top. Of course, there is a starry sky of examples to the contrary over the earth.

History has not yet ended, whatever one might think. I believe we have to be concerned about American freedom. How can we monitor it?

I agree with George Lakoff that the American freedom is progressive: it is something that can increase. If it shrinks, it is utterly un-American.

Following Lakoff's concept, I believe that we can measure not the absolute amount of freedom but the change of freedom whether from yesterday to today or from the USA to North Korea by comparing the mere number of restrictions.

We can become the slaves of Liberty, as we can become slaves of any abstract idea that is pursued at the expense of basic human **needs**. This can be the idea of God, Communism, Capitalism, Protection of Life, Animal Rights, The Good of the Nation, Family Values, Justice, Moral Purity, Economic Growth, The Right Way to Break the Egg, etc., and Freedom itself. According to my personal decades long observation, the root of totalitarianism is the primacy of an abstract idea over basic human needs.

6. I believe, however, that such progressive rights as well-paying jobs, benefits, public health, consumer protection, and good affordable education belong to the category of Pursuit of Happiness rather than Life and Liberty.

The capitalist idea does not promise happiness to anybody. Neither does it guarantee life to soldiers, astronauts, and even presidents. As for justice, the case of Mary Kay Letourneau seems to me flagrant medieval barbarity. Nevertheless, America looks like a remarkably happy society, contrary to some research. Its happiness is either earned or within reach. I believe little in the happiness which comes in rare short bursts, but more in overall satisfaction and optimism.

Unspecified freedom is an abstract idea. Every abstract idea is subject to various interpretations. Irrationality, paradox, and contradictions accompany all ideological uses of freedom. The American Civil War was as much for freedom as against it. *Post factum*, the Iraq war is an example of the ideological use of freedom to justify violence.

I do not believe, however, that we could achieve any logical consistency in dealing with freedom. Freedom is so vague and controversial because it has a whole spectrum of opposites: slavery, detention, necessity, scarcity of choice, legal restrictions, peer pressure, customs, rituals, and control are some of them. Therefore, there are as many freedoms.

We cannot live our lives by any theory. We just pursue life, liberty and happiness as we understand them and see what happens to us along the way.

7. I believe that freedom, the most American phenomenon of all, originated from:

abundance of land under generous sun,

abundance of human resources,

geographic isolation of the United States, and

the insular mentality: everybody is an island, contrary to John Donne.

At the dawn of the twenty-first century, in the age of globalization, the original sources of American freedom are limited. The open frontier has been built over with fences and watch towers. There is an overwhelming national drive, which is neither life, nor liberty, nor pursuit of happiness, nor even a matter of choice. It is production: making things and services for sale, growth, expansion, and profit. Most of the production has nothing to do with basic human needs such as good health, good food, good air, good family, good education, good future, and good rest, although the rest of it serves the above purposes. We live longer, but complain about poor health, plastic tasteless tomatoes, pollutants in air and water, the breakup of family, laughable public education, nonexistent job stability, and short vacations. As if it was not enough, we have the worst government money can buy and are engaged in a Cold Civil War. Yet we are basically happy as a society, which I derive not from TV or World Index of Happiness, but from personal observations.

If we are happy, why should I care?

WHY DO I WORRY ABOUT AMERICA?



I care because for 20 years a small American flag has been sitting on my desk. I do not want to be tempted to move it to a darker place.

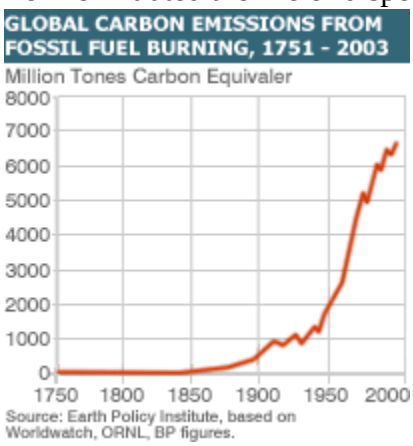
1. I love freedom as I love life. America is the largest reservoir of freedom on earth. If it dries out, there is nothing comparable in sight.

Like the level of water in the ocean, freedom depends on historical climate. Independence, however, is more like lakes and rivers: they rise and fall after a recent rain or drought. Dependence can be a free choice. Freedom can be preserved among dependence. In the see of freedom, independence is a desert island.

2. American freedom is supported by high consumption of energy. America is the largest consumer of energy on earth. It could be the first to die of caloric thirst and hunger. Or the first to adapt to it.

I see the industrial civilization is a giant bonfire, ignited by the Industrial Revolution, in which the coal and oil are burning at increasing rate. This fire plays the same role as the sun played in emergence and evolution of life on earth: it is the source of energy for sustaining the short and ever shrinking life of man-made things and institutions.

The fire initiated the life of disposable things and metabolism of money that cannot be controlled by human desires anymore. Economy is a separate life form, similar to biochemical life that we know. Humans serve as enzymes in the biochemistry of technology.



Bonfire of vanities

There is nothing in the laws of nature that contradicts the concept of green civilization. The way of life of humans can be balanced against the supply of energy, as the life of animals and plants was before the advent of man. The unrestrained production of things is already suppressing human procreation, creating conditions for limited growth.

Nevertheless, the price for equilibration can be the global extinction of democracy and middle class and a return to more energy efficient vertical authoritarian social structures.

The things (i.e., *Technos*: life forms based on technology instead of biochemistry) may have an evolutionary advantage over wasteful, expensive, and prone to malfunction humans. When humans and Things begin to compete for resources, the situation may resemble a version of the War of the Worlds.

With modern digital technology we have created an invasion of unusual aliens. Things and us are moving toward the joint **digital genetic code** but still have different means of its expression. As result, we, humans, are becoming more thingish, programmable, intellectually downsized, standardized, reined in by debt, and controlled, while things become more human, sly, devious, and they develop their representation in the government. The US Government represents things and humans, while the ratio of priorities constantly moves toward the prevalence of things. At the same time the tribal societies fuse humans with weapons, creating the most apocalyptic approximation of the invasion of aliens. The old European societies are under the double pressure from both.

3. I value stability. It is believed that wealth ensures stability. America is the largest reservoir of wealth on earth. I see this as a source of instability, however. Throughout history, the largest and richest countries of Europe initiated most of the wars.

I believe that the ongoing enormous accumulation and concentration of wealth can have only one result: further accumulation and concentration of wealth. The results of the application of a concentrated wealth to a personal goal can be good, bad, unpredictable, or uncertain. Once we are beyond basic human needs, good and bad lose boundaries.

I believe that the ongoing unlimited concentration of wealth can mean only an increasing instability of the nation. Social unrest has been historically a very probable result of inequality and internal friction. In times of instability, the country saturated with weapons in private hands is sitting on a powder keg. Weapons may mean a hot civil war.

Money is the measure of energy to be applied to either good or evil ends. Wealth feeds charity. Wealth saves lives. Wealth also hires and equips an army to fight for a cause. Moreover, big wealth can maintain two private armies. Further, the army needs a general. The general wants a victory at any price: the private victory. The general and the society may have different visions of what victory is.

My intuition tells me that like the initial accumulation of wealth created fertile soil for capitalism in the past, its further accumulation may lead us to a new stage **which we cannot fully understand until it arrives**. In short, it means that the popular vote loses its historic significance because the concept of vote is based on the assumption that the voter knows what the alternatives are. While ideas have always been regarded as the opposite of material things, in the world saturated with money, ideas are padded with the monetary backing of their sponsors. There will be weak and flaccid ideas, as well as fat and bullish, regardless of what they mean.

4. I believe in the great and unique dynamism of the American system and I am anxiously waiting for the next proof of it. I hope to celebrate America's bootstrapping out of the current slump.

I have great reservations about the dynamism of the American system because the important matters submitted to the voters are **too complex to be understood** by most of them and, moreover, by many elected leaders. This is the major threat to democracy in America, where ignorant and dishonest people can be elected presidents and where enormous power can be concentrated in the hands of private non-elected cliques. American anti-intellectualism today, in a different and mostly hostile world, is the worst autoimmune disease of the national body.

> Science becomes a kind of magic for common people and they turn from it to the magic of religion, which at least speaks the sweet mother tong of humanity. It does not speak, however, the language of reason when common people have to decide the fate of other people and their own.
>
> The resurgence of religion is the direct consequence of the degradation of education because of the rising complexity of science, but there are plenty of other reasons. If anything needs a revolution in America, it is education. The basic picture of the world can and should be unified and simplified.
>
> Common law also speaks inhuman language, but can be at least translated by lawyers for good profit. Science is not translatable. I believe, however, that anything of crucial importance can be explained. The difference between scientific knowledge and general understanding comes to the foreground.

5. I regard independence a much better synonym of Liberty than freedom.

> "To raise the question, what is freedom? seems to be a hopeless enterprise. It is as though age-old contradictions and antinomies were lying in wait to force the mind into dilemmas of logical impossibility so that, depending which horn of the dilemma you are holding on to, it becomes as impossible to conceive of freedom or its opposite as it is to realize the notion of a square circle. "
>
> Hannah Arendt. *What is Freedom?* In: *Between Past and Future, N.Y.*: Penguin Books, 1993, p.143.

Freedom and independence are two different things. It is very hard to define the murky freedom because the word **free** is used in a dazzling array of meanings and nobody and nothing in the world is completely free. Just think about the free stock market kneeling before the Federal Reserve Dominatrix. Independence, on the contrary, is always transparent. We can trace bonds between entities, as well as their absence. Thus, I believe that the media that **depend** on the money of advertisers and donors are not independent by definition. I believe that any company or author who **depends** on a large customer base is not independent.

I believe that the freedom of choice from a menu is the most miserable kind of freedom.

APPENDIX

1. Hannah Arendt on courage:

> Courage, which we still believe to be indispensable for political action, and which Churchill once called "the first of human qualities, because it is the quality which guarantees all others," does not gratify our individual sense of vitality but is demanded of us by the very nature of the public realm. For this world of ours, because it existed before us and is meant to outlast our lives in it, simply cannot afford to give primary concern to individual lives and the interests connected with them; as such the public realm stands in the sharpest possible contrast to our private domain, where, in the protection of family and home, everything serves and must serve the security of the life process. It requires courage even to leave the protective security of our four walls and enter the public realm, not because of particular dangers which may lie in wait for us, but because we have arrived in a realm where the concern for life has lost its validity. Courage liberates men from their worry about life for the freedom of the world. Courage is indispensable because in politics not life but the world is at stake. (Hannah Arendt. *What is Freedom?* In: *Between Past and Future*, N.Y.: Penguin Books, 1993, p. 156).

2. Condensation of wealth

We argue that the history of economies is paved with wealth condensation dynamics which start slow and often lead to social unrest. Understanding stabilizing factors on a global scale are crucial.

Links： Dieter Braun. *Nonequilibrium Thermodynamics of Wealth Condensation*

Nonequilibrium Thermodynamics of Wealth Condensation (Arxiv preprint)

Dieter Braun, **Physica A 369**, 714-722 (2006)

2006

Essay 43. The Cold Civil War in America

We tend to forget that the warning signs of a historical turn are visible only to a few dedicated bird watchers who acquire the status of prophets only *post factum.* For a bunch of professional worriers and insomniacs there are scores of optimists who believe that life tomorrow will be like yesterday and the day after, and if not, then something will be done.

I believe that we do not need an inflamed imagination to see that no great idea, no sanctified by time institution, and no historical document can stand in the way of a sufficient number of educated, unscrupulous, and loaded with their or donated money people determined to turn the country if not around then sharply enough for the rest of us to feel the curve and hold on to their seats.

My most troubling impression since 2000 is that we, Americans, have been given a **tasting of a one party system**. I recognize it with my Russian memory, but others may not identify the unfamiliar taste. In Russia the system followed revolution and civil war. In America, the Cold Civil War followed the Republican Revolution.

I mean not a temporary one-party rule from elections to elections, but the one-party **system**, i.e., the result of a revolution, intended to last for thousand years.

> **NOTE**: This Essay had been finished before I read *One Party Country: The Republican Plan for Dominance in the 21st Century* by Tom Hamburger and Peter Wallstein (John Wiley, 2006).

Here are some illustrations to begin with.

> **Google search on August 1, 2006** generated the following results: (last figure is for August 17)
>
> **88** for **"democrats are shameless"** **(75)**
>
> **107** for **"republicans are shameless"** **(81)**
>
> **705** for **"shameless democrats"** **(656)**
>
> **721** for **"shameless republicans"** **(710)**

3,460 for **"kill democrats"** **(3450)**
636 for **"kill republicans"** **(555)**

Results for November 2, 2006:

293 for "democrats are shameless" 357 for "republicans are shameless"

760 for "shameless democrats" 880 for "shameless republicans"

2,850 for "kill democrats" **3,040 for "kill republicans"**

Democrats are still in Halloween mood. Republicans, beware.

Of course, "kill D" or "kill R" should not be taken literally, but it looks like one side is much more bloodthirsty than the other.

Here is an example of *vox populi*:

> The Cold Civil War started the day the Clinton's and their crooked, corrupt, communist gang took over the White House. It only got nasty when they were pushed out.
>
> Posted by: "PTG" at April 23, 2006 10:05 AM

On August 11, 2006, Google brought about **869** results for **"cold civil war" America**
On August 17 **.....** **932**

UPDATE, February 17, 2009: Results **1 - 10** of about **11,100** for **"cold civil war" america**

UPDATE, April 4, 2016: **"cold civil war" america** About 8,930 results .
Détente? Thank God!
But wait! "american civil war coming in 2016" About 547 results (0.35 seconds).
At least, not in 2016. Probably.

The question whether America is in the state of CCW has no answer because we have no established precedent of CCW. Besides, there is a point of view that political parties are a bloodless alternative to hot civil wars between elites. Politics, therefore, means a cold civil war by definition.

With my Russian past I see the one party system as a cold war of the government against its own people. This is how the Russian political life was defined through centuries under whether the czars or Communists. The troubling question I ask myself in America is whether a two party system can turn into a war of a party against at least half of its own people. Currently, it is still a tug of war. Or is it?

> **NOTE** (2016). The government shutdown of October 2013 looks like a shot across the bow coming from the Reds. Their Generalissimo is now seeking presidency.

As history testifies, all we need to justify a war is to label the opponents as an enemy, i.e., people with incorrigible flaws, guilty of unforgivable offenses, dangerous, of lower race or not quite human at all, and deserving to be either dominated or exterminated. At any rate, they must be crushed. Imagine, for example, that your opponents are baby killers and marriage breakers. Those are your babies and your spouses, fellow Americans!

But to start a war is not the same as to justify it. It requires the premise that the war is in national interests. **By definition, a civil war is never in national interests.** There is a basic ambiguity about civil war, however, because it may lead to a dramatic change in the historical direction of the nation, for better or worse. Many people in America and abroad have a feeling that we are at historical crossroads.

The Cold Civil War in America is nothing but a metaphor . It refers to the degree of despise and hate between the sides, overall level of frustration and anger, deep divisions and irreconcilable differences, offensive tone of allegations, absence of middle ground, territorial segregation of forces, utter cynicism, abandonment of civility and decorum, lack of dialogue, paralysis of the defeated and the jubilation of the victorious, the signs of disarray, decline, and incompetence in various spheres of public and even corporate life (the military incompetence is most perilous of all), and dozens of other signs. But most telling of all, in my opinion, is the standoff between two entrenched professional armies having no qualms, paid or promised a pay-off, wired, battle tested in last two campaigns, and ready to attack any moving target. The armies of political strategists, ideologues, campaign managers, analysts, commentators, consultants, pollsters, interns, trainees, volunteers, string-pullers, muckrakers, mud-slingers, door-knockers, wind-sniffers, check-writers, check-pocketers, and TV-ad-sharpshooters have only one goal: victory at any price. Whether they have any wiretappers, spies, and double agents among them is too early to tell, but I bet they have. Otherwise it would not be war.

There is another important property that CCW shares with any war: it is not just an exchange of verbal katyusha rockets between the trenches, but a **fight for a territorial gain**: the number of seats in the Congress, Supreme Court, and the all-or-nothing possession of the compound at 1600 Pennsylvania Avenue, Washington, DC. If we look at it with jaundiced political eyes, this great land of ours—from sea to shining sea—shrinks to a yellow post-it note with a few numbers. The victory in this war is perfectly defined—to the envy of the two hot wars running today, in August, 2006, in parallel: in Iraq and Lebanon.

The front lines in this war move only along the political calendar: from election to election. The current situation could be best described as the occupation of the political **space** by the Red Army and the deep retreat and disarray of the Blue Army, but the reversal of fortune in wars is rather typical. The Blues might have—must have—their Saratoga, Gettysburg, or Stalingrad victory. Otherwise they could just surrender.

The ***de facto*** **one-party system** has only one major obstacle on the way to realization: elections. It seems that no group of people, however smart, influential, and unscrupulous, can derail the will of the people, but modern elections, especially the e-elections, have an extensive map of soft underbellies and Achilles' heels all listed in atlases of political anatomy. Watching the last presidential elections, I had an impression that elections, the last line of defense of democracy, could be mined, undermined, and manipulated to an extraordinary extent, technically, as well as by brainwashing. I am certainly hypersensitized by the ***de jure*** **one party system** under which I had spent most of my life in Russia, but I am worried—and encouraged—by the indigenous voices of the bloggers and commentators that seem to read my mind. Are we the dedicated bird watchers?

> **NOTE:** I read **Too Late for Empire** by Jonathan Schell after this essay had been finished.
> (http://www.thenation.com/doc/20060814/schell)

The subject of the American politics is inexhaustible. I am not only ignorant of political science, but seem to have caught up the American attitude toward politics, which is an unmixable cocktail of icy apathy and hot substance abuse. I express the point of view of a creature who does not live in the mud but somehow is fascinated by the substance, looking at it from a tree branch. There is nothing edible, but it emanates a mysterious attraction. Is it dead or alive?

I sometimes think that in the electronic era we are all political apes and have to start an evolutionary ascend anew.

So, what about the electorate?

"The best argument against democracy is a five minute conversation with the average voter." (Winston Churchill). I disagree and have a pro-democracy argument. The meaning and value of the popular vote is exactly what it says: the number. It is like the temperature outside (or inside), atmospheric pressure, speed, or the price of oil. We can argue about anything—including the accuracy of the gauge and whether it is rigged—but not with the number itself. I think that the electorate has always been the same because of the robustness of human nature, but something around the electorate has dramatically changed as result of the continuing industrial revolution that has switched from making bolts and nuts to making information and disinformation.

In this essay I select only one subject of a general and non-political nature: the driving force of the evolution of complexity because I believe that the true cause of the current political crisis (not yet full-blown) is the unbearable complexity of modern issues that puts the American style democracy under a pressure to morph under the star-and-striped skin into corporate democracy. This term is mostly used in a very different meaning: as the internal democracy of a public corporation. I understand it as the system that gives the status of individual to associations: creatures made of thousands

individuals, but governed by a few. With all my political naiveté I believe (I am sure I am not alone) that this limited and illusory but fundamental principle of the ownership democracy or **market democracy** sooner or later begins to compete with the equally illusive and limited political democracy. It does not even matter whether a company is public or private or whether an association is ACLU or the Christian Coalition of America. The principle one man, one vote is the essence of political democracy because most people vary only within relatively narrow limits. One corporation or a large private wealth can be thousand, hundred thousand, or million times larger than another. The function of corporations and associations is to maintain inequality.

The **concentration of power** that used to separate the king from the peasant will always interfere with the well-intended design of democracy. The difference between absolute quantity and concentration (known in science as the difference between extensive and intensive values) is well known to chemists, alcoholics, and politicians.

The largest corporate creature was (first?) described by Thomas Hobbes, **Figure 1.**



Figure 1. **Part of the title illustration to Thomas Hobbes' *Leviathan*. The human figure symbolizes a commonwealth (i.e., formed by social contract state, nation, or civil association). It is made of little individual human figures who hand over their collective will to the ruler.**

As we would say today, individuals are the living cells of the social organism. Joseph Stalin called common people "little screws" of social mechanism.

I invoke Thomas Hobbes not because I am captivated by his philosophy but because of his powerful political imagination.

A modified representation of a **corporate democracy** would be a figure consisting of individual figures **of different size** as well as of corporate figures of the same design as the all-comprising one. In other words, the structure of the modern Leviathan is fractal (Google "fractal") , Figure 2.



Figure 2. **The fractal Leviathan.**

I am attracted to the term **corporate democracy** because Hobbes himself used the word **corporation** for a composite creature. Hobbes anticipated a kind of nested structure of the commonwealth, did not like it, and expressed his vision with great eloquence.

> Another infirmity of a Commonwealth is the immoderate greatness of a town, when it is able to furnish out of its own circuit the number and expense of a great army; as also the great number of corporations, which are as it were many lesser Commonwealths in the bowels of a greater, like worms in the entrails of a natural man. (*Leviathan*, Chapter XXIX).

As result, although the principle "one man, one vote" stands, each individual vote is shaped, warped, twisted, stretched, and turned by a highly complicated power field. In corporate democracy, which is probably synonymous with **free society**, every citizen is a building block of two completely different but interacting systems: the popular vote power system of equals and the economic power system of anything-but-equals. This is neither good nor bad: this is how it is. Judging by results, this has been working for

America for a long time. How it is going to work in the future is an open frontier for imagination. I suspect that simple natural principles are acting in history. For example, under a great stress, pressure, and hunger, the state digests its worms and cuts on pluralism of any kind. This is not a subject of this Essay, however.

While the average voter cannot make an informed decision on a complex issue (which may not even have a solution, as Henry Kissinger once said about the Middle East problems), scores of decisions about complex issues are made on the political battlefield by non-elected political generals, some of them reporting to the Generalissimo elected by the average voter .

As a believer in the limited repertoire of historical patterns, I feel free to borrow, in spite of my disgust, a term from the Russian Communist past: politburo (political bureau). Politburo is the true seat of secretive and deceptive power based on personal loyalty. It seems out of place in a multiparty system, but I cannot overcome my gut feeling that the **gravitation toward the politburo style is the very essence of the current presidency**. This comes as close to the one party rule as number 2 is close to number 1 (See Simple Reason No. 78 in **Essay 28**).

> Unlike most other denizens of the Internet who have come to the same idea (Google, August 16, 2006: **868** for "**american politburo**") I actually lived under the original Politburo, which does not make me a political expert, but confirms a decent pedigree for a K-9 working dog .

Of course no president is for life, but in the dynamic modern life, eight years is the last unit of time before forever.

It is pretty obvious that the complexity of the world is growing. But how can complexity polarize America?

Let us try to trace the source of complexity in non-political terms.

There is something obviously wrong with **Figure 1**: as a living creature it is not **differentiated** enough. It is **simple**. **Figure 2** adds very little to the complexity because the **pattern** remains the same: most parts of the system are built in the same manner as the whole system.

Complex structures develop by differentiation. In the most abstract way, the pattern of differentiation looks as a sequence of stages in which new building blocks appear at contact points between the old ones or between the evolving structure and the external or internal environment. New building blocks grow and differentiate further.

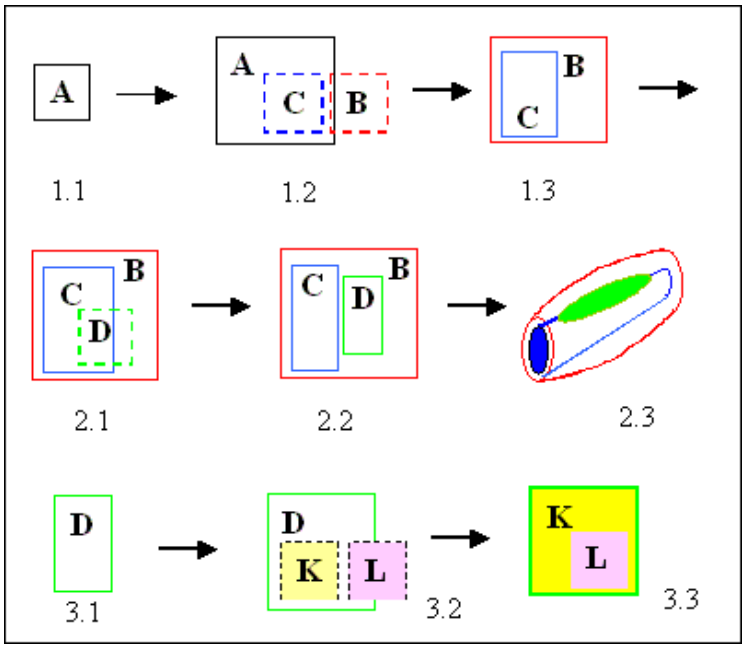


Figure 3. Structural differentiation

In **Figure 3** we start with a building block of type A (1.1). A block can consist of identical "cells" or components. Differentiation consists in splitting it into two new different blocks of type C and B (1.2 and 1.3). For example, B develops between the external environment and A, while C grows between the internal environment and A.

Think about A as a mom and pop company that expands and separates its shipping and receiving functions. Or imagine a primitive blob of cells that develops a kind of skin (ectoderm) and a kind of digestive tract (endoderm).

Next, along the surface of contact between C and B, a new intermediate kind of block (*mesoderm*) develops: mesoderm D (2.1, 2.2). This can be a marketing department or, if you wish, a skeleton with muscles. It can differentiate further, producing blood circulation and kidneys. A schematic picture of the creature (3.3) shows its outer layer in red, internal passage in blue, and additional organs in green. This is not intended to render the actual embryological picture, for which you can google ectoderm, endoderm, and mesoderm.

We can observe the pattern in all detail in the development of biological species and contemporary social structures. Development of language—individual as well as historical—follows the same pattern of complexification from the simple patterns of Babylonian literature to the convoluted and multi-nested European prose of the twentieth century, now almost extinct. Science, developing new disciplines in border areas between two established areas (for example, biochemistry and physical chemistry) is yet another example. Department of Homeland Security is a relatively new organ of the American Leviathan.

The development of embryo starts from a series of cell divisions that produced a small blob of identical cells (morula), which further develops into a hollow sphere (blastula). The sphere caves in like a punctured ball, so that a kind of a double-wall cup (gastrula) forms. The external layer is called ectoderm and the internal wall is endoderm. In most animals a new layer—**mesoderm**—develops between the two first ones. While ectoderm further differentiates into skin and whatever grows on it, mucous membranes, and teeth, as well as nervous system, endoderm unfolds into whatever constitutes the inner passages for food and air. Mesoderm further develops in a vast array of tissues that are positioned between the external and internal surfaces: blood vessels, the connective tissues, bones, the muscles, kidneys, and the reproductive glands. **Figure 4** illustrates the principle.

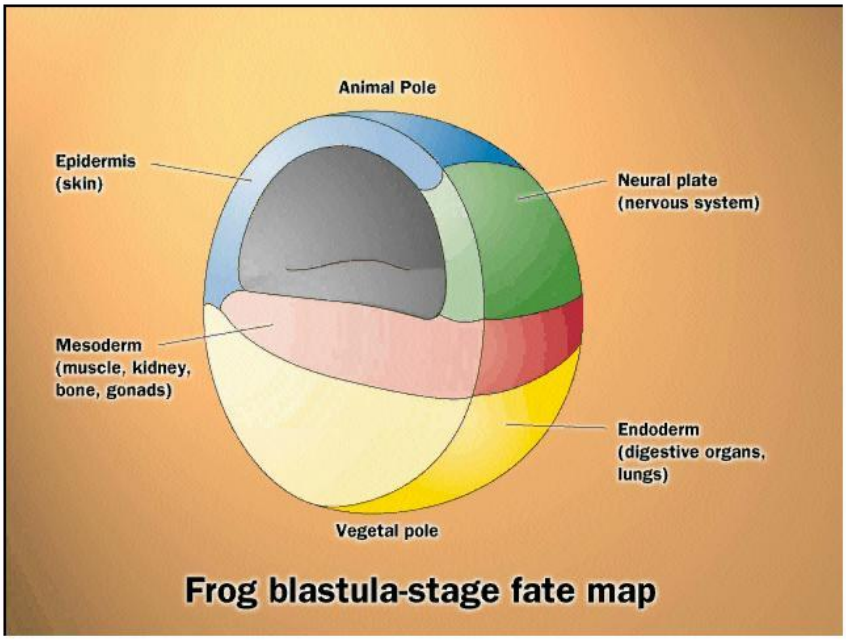


Figure 4. **Beginning of embryonic differentiation**

History of technology is as much illustrative of the principle as biology. For example, the computer mouse jumps off the keyboard. A simple cable between the computer mouse and the computer disappears and a more complex wireless system takes its place. The newborn cell phone crawls out of one's pocket and grows a case between itself and the owner's body. Government flaunts new shiny agencies on top of the old scratched and patched up ones. A heartburn remedy flaunts a rainbow of colors and flavors on top of the ancient baking soda.

There is a fundamental difference between complex living objects existing as populations and unique social structures: a "new and improved" but deficient member of a population is eliminated while the population itself only gains from erasing the genetic memory of the failure. A unique social structure usually drops out of the game and is succeeded by a different player. Human history and natural history are made in

different modes, the main consequence being a much faster pace of human history.

> The distinction points to a close similarity between species and man-made things: the latter also form populations. The manual typewriter may avoid a catastrophic extinction for a while and the bicycle—as well as a riding horse—can survive along with cars. Institutions do not make copies. Unlike unfortunate blueprints of organisms, ideas, whether fortunate or unfortunate, are never forgotten. We remember and admire Thomas Hobbes. Half a century after the defeat of Nazism, Hitler's ideas still flourish in some minds and grow new skins in new languages. Under favorable circumstances they could again capture the minds of millions and declare democracy and humanity evil ideas. The Confederate Flag is an embodiment of an idea of resistance. So is the yellow flag of Hezbollah.

To put it all differently, biological organisms and things evolve in the direction of perfection, i.e., adaptation to the environment, while leviathans, i.e., artificial men, as Hobbes saw them, develop toward the imperfection that finally kills them, quite like human and animal individuals.

Individualism is risky and the price and reward for being free are both high.

From this perspective, whoever wins, the victory in a civil war is a truly catastrophic event with deep and long-lasting consequences for a political structure. What never dies is ideas: the germs of the next civil and not so civil wars survive in the fallow soil of the minds.

I believe that the American electoral mechanism fertilized by enormous amount of money and made technically swift and efficient by modern technology has grown to an unprecedented size and complexity—one can compare it if not with cancer, then, in the spirit of Hobbes, with a gigantic intestinal parasite. It came from the mesoderm and positioned itself between the presidential or other candidate and the electorate with the single goal of the well-defined victory at any price. The background, appearance, ability, biography, ideals, and personality of the candidate are nothing but means to achieve victory. They can be faked as anything else—a military ruse is legitimate in war. A rectangular box of a tele-prompter can be placed between the shoulder blades of a presidential candidate but the hypnotized audience might brush the vision away and the commandos of the army will swipe off all the remaining questions. In the complex world, attention span cannot be longer than a heartbeat. The more we see and hear, the more we miss. Thomas Hobbes and Aristotle are symptoms of my nostalgia.

A dour pessimist can see American political life as cold civil war. A cheerful optimist can call it just a spirited political game: football, baseball, whatever. I am sure that Newt Gingrich and Karl Rove have had a lot of fun with it. Whether war or game, the pursuit of victory by two opposing sides excludes any middle ground. It does not exclude a tie, however, which the dour pessimist would call political paralysis.

There is an inherent asymmetry between the enemies loosely labeled as **liberals** and **conservatives**, which only partly coincides with the party allegiance. The conservatives know what they fight for: it is what they want to conserve. It is like fighting for your home and family: they are here and now, although the old homes are long gone. Liberals fight for a better home and family. As soon as the conservatives win, the liberals start fighting for their own trampled ideas as for the home and family, while the conservatives do not have anything to fight for anymore, until the liberals win. And so the see-saw goes. The conservatives fight for the heritage of dead liberals. The liberals fight for the ideals of future conservatives. But the fight for home and family justifies any means while the fight for liberal ideas justifies only the means already justified by the liberal ideas. This is why the conservatives are, as an average, strong, ruthless, rich, and mean, while liberals are, as an average, bright, poor, civil, and, well, liberal. As some have already noted, today the Republicans are radicals and the liberals are conservatives. The liberals are bound by the principles and the conservatives are bound by the discipline. I believe that if a physiognomist sorted out the mug photos of the members of Congress into two stacks, they would more or less reflect the party allegiance.

If not Cold Civil War, then what is it? An alternative perception could be that the US two-party system, with money hemoglobin in its blood, looks more like a competition between two giant and powerful public corporations, one of them looking more private than public under George W. Bush. The stockholders still have a say, but there is a chance that one or both corporations can be privatized. Anyway, what is competition if not a cold civil war, the Hobbesian *bellum omnium contra omnes* reduced to the absolute minimum of fighters?

WARNING! In the atmosphere even faintly smelling of a one party system, the greatest error is to identify the will of the leviathans with the will of their chosen leaders.

The blessing of the Web is that you can silently cry full voice.

For introduction, see Essay 41. The Morning-after Questions.
For my background, see Essay 42. Credentials and Credo.
The chemist's view of the world is being presented at http://spirospero.net

APPENDIX

1

The main question of the CCW is what is going to happen **faster**:

1. Further entrenchment and consolidation of the Reds which would crush the resistance of the Blues.

2. A sweeping electoral victory and the reversal of fortune of the Blues, which would not necessarily end the war.

3. A deep change in the US political system as result of the arrival at the tipping point of the historical trend.

4. A new turn in American politics which can be imagined, as we can imagine anything we like or fear, but which is built of known elements. For example, as a pure fantasy, we can imagine a formation of an **Alliance of National Unity**, consisting of congressmen whose idea of victory does not have any party affiliation and is defined as pulling the nation from the deep mud. Note that the way toward this rather fuzzy goal can be accurately monitored by the numbers of national debt, trade deficit, military losses abroad, inequality indexes, crime rate, mortality, healthcare affordability, and quality of environment.

2

An incorrigible dreamer, I still count any national unity (**Appendix 1**) as highly improbable. I have only some intuitive reasons for that, which I am going to present in short. By generation I mean generation of leaders, or, as some would say, an elite.

I believe that the generation whose childhood started under the blinking eye of TV is dramatically different from the numerous generations whose childhood flew on the wings of books. The generation of the electronic games and musical videos promises to be even more different. **Generation B** (**B** for books) was connected to the roots of humanity or at least national roots, which, in the case of America, were those of the West. It was a generation of a long attention span. **Generation TV** is inclined to think in short time intervals around the current moment, with little distinction between reality and appearance. I suspect that **Generation G** will not be connected to anything at all, except, maybe, the very process of perception. As somebody who has lived in America long enough to remember senators Patrick Moynihan and Paul Simon, I do not expect people of that type to appear again. Intelligent and imaginative people are vanishing from public service while the Public Radio is fading away from the national air. As the sloppy security record of Microsoft testifies, intelligent and imaginative people might be gradually departing the corporate life, too. I have no idea where they go.

The general trend that I have been observing for quite a while can be called the shrinkage of the imagination space.

Regarding the ongoing transformation of the modern culture, what is most important amounts to three circumstances. First, immediate sensual perception is given priority over reasoning. Second, because of the competition for time, any prolonged reading and thinking has little chance of standing against the flood of sensory data, cell phone rings, and email tickling. Third, we tend to believe that if we wish something very much, it will happen. We see life as a movie with a strawberry jam blood and a happy end.

3

Thomas Hobbes, *LEVIATHAN* (1651) .

From INTRODUCTION**:**

For by art is created that great LEVIATHAN called a COMMONWEALTH, or STATE (in Latin, *CIVITAS*), which is but an artificial man, though of greater stature and strength than the natural, for whose protection and defense it was intended; and in which the sovereignty is an artificial soul, as giving life and motion to the whole body; the magistrates and other officers of judicature and execution, artificial joints; reward and punishment (by which fastened to the seat of the sovereignty, every joint and member is moved to perform his duty) are the nerves, that do the same in the body natural; the wealth and riches of all the particular members are the strength; *salus populi* (the people's safety) its business; counselors, by whom all things needful for it to know are suggested unto it, are the memory; equity and laws, an artificial reason and will; concord, health; sedition, sickness; and civil war, death**.**

From CHAPTER X. OF POWER, WORTH, DIGNITY, HONOR AND WORTHINESS:

The greatest of human powers is that which is compounded of the powers of most men, united by consent, in one person, natural or civil, that has the use of all their powers depending on his will; such as is the power of a Commonwealth: or depending on the wills of each particular; such as is the power of a faction, or of diverse factions leagued. Therefore to have servants is power; to have friends is power: for they are strengths united.

Also, riches joined with liberality is power; because it procureth friends and servants: without liberality, not so; because in this case they defend not, but expose men to envy, as a prey.

The value or worth of a man is, as of all other things, his price; that is to say, so much as would be given for the use of his power, and therefore is not absolute,

but a thing dependent on the need and judgment of another. An able conductor of soldiers is of great price in time of war present or imminent, but in peace not so. A learned and uncorrupt judge is much worth in time of peace, but not so much in war. And as in other things, so in men, not the seller, but the buyer determines the price. For let a man, as most men do, rate themselves at the highest value they can, yet their true value is no more than it is esteemed by others.

4 See **Essay 33. The Corg**

5

I have an alternative interpretation of what is happening with America. OK, this is not a civil war. It is a trade war. Two political parties are two public companies in which some American citizens invest money, others vote, and some do not give a damn. The companies advertise their product: the seats in the Congress and beds in the White House.

I foresee the following objection: in the stock market you lose or gain money only, but with this companies you can lose your home and life and never gain another. This difference does not seem relevant because with some products of agricultural, automobile, tobacco, and pharmaceutical industry you can lose you life, too.

On the other hand, you invest in a company stock and not in its product. I suspect that the biggest investors into political marketplace buy the stock of Wal-Mart, but never set foot there.

It is a war, anyway. Only not civil.

2006

POSTSCRIPT (June 10, 2009): Apparently, the expression "Cold Civil War" was first applied to America by William Gibson in *Spook Country* (1982).

March, 2016. By the End of Barak Obama Administration, the American Cold Civil War looks more like the Republican Cold Nuclear War on Democrats, but its recent result is The Cold Republican Own Civil War. Ominous historical parallels are discussed in connection with the pattern of Donald Trump drugging a hemisphere of the national brain.

NOTE (2016). This is the year of the dirty and uncivil war inside the Republican Party and a senseless self-defeating, a tad less-dirty, and a bit more civil tug-of-war inside the Democratic party. Two Primaries contestants from each party—Trump and Sanders—have, in essence, no love lost between them and their nominal parties and are driven by pure ambition and chutzpa. But the electorate wants war or at least a scuffle and cheers them up with screams and whistles.

Essay 44. Remembering Russia: 1940-1987

Through a crack in time-space

History would be a mere entertainment if not for its smooth merge with the future. Suddenly you feel history catching up with you. The future is right behind the corner, you see its shadow, but not what casts it, unless the future itself can see your face. Yet the shadow looks familiar.

Where exactly does the past-to-future transformation happen? It can be last year or yesterday, next year or tomorrow. Thus, the September 11, 2001 attack on USA was already in the future during the first attack on the World Trade Center, February 23, 1993. That day, with its own roots in the past, the 2001 event started its seven year long ascent from the murky depths of probability to the sunlit surface of actuality. Some, like William Dobson, plant the seed of the 9-11 in 1991, when the Soviet empire had collapsed and the world was knocked off balance. It is hard to dispute. The 1991 death, however, connects with the 1917 birthday and goes back to Karl Marx and Industrial Revolution, and far back to the taming of fire.

As a *fait accompli*, the 9-11 immediately unrolled a whole spectrum of options for the American future, ranging from the current morass in Iraq, the loss of world prestige, and the even more troubling signs of the "slow acting coup d'etat" on part of the President, as somebody put it with a feeble question mark on Public Radio. Jonathan Schell (1943 – 2014), who had clearly formulated the major American dilemma, did not put a question mark after "one party government." And "The Greatest Story Ever Sold: The Decline and Fall of Truth from 9/11 to Katrina" by Frank Rich tells it all in the title. The sober and brilliant critics have suddenly popped up from the cooling down soil of the fall elections like the spring daffodils. A conspiracy of truth.

Looking much farther back into history, we see the seeds of major events, such as, for example, American Civil War and World War 2, germinating years before their fruits fell to the ground and left the seeds of future events. Moreover, the patterns of history are not tied to geography. The story of the fall of the Roman Empire is generic on many continents. Revolution, terror, dictatorship, aggression, war, restoration, recovery, reconciliation, revival, expansion, rise, renaissance, decline, and decay are patterns: the standard circular blocks of history. That there is nothing new under the sun was certainly true in the time of Solomon.

The origin and the consequences of big events is the favorite trade of ambitious historians. The lay people who lived long enough to witness at least one major cataclysm become unwilling historians, too. They discover something important about themselves after having met the future face to face.

I remember myself since 1940. When the World War 2 had ended, I was nine, too young for the sense of history, but old enough to have pictorial memory of the period.

The major historical event of my life was the grave illness of Russian Communism in the late1970's, followed by my personal conflict with the agonizing and twitching body and my escape to America. I thought that would be enough. Today, however, I have a feeling that the fall of the Soviet Empire was just a link in the long domino chain set upright somewhere around the beginning of the nineteenth century.

In the fall of 2006 I see America entangled in two sluggish Kafkaesque wars hardly visible for most normal, stable, practical, and busy people, but haunting those few who themselves are prone to be torn by internal wars in their hearts.

> 1. The Cold Civil War, (see **Essay 43, The Cold Civil War in America**) about the fundamental democratic principles of the US Constitution, waged against the demoralized opposition by a politburo-like group propping the increasingly comical President.
>
> 2. The hot, endless, and hopelessly inept war waged by the mainstay of democracy against Iraq with the purpose of making the invaded country democratic and therefore incapable of waging any hot war in the future. It looked in the beginning like an immunization shot against the disease of war by a dose of a war vaccine, but now it is a flaring infection. The vaccine was pure and unadulterated germ.

Of course, my grim vision comes from my background, personality, and idiosyncrasies. More and more often, however, I hear the native voices that go as far or much farther as my own dark perception of things in **Essay 43**.

In this Essay I want to look at the long gone history of the Soviet Empire as a future. Already forgotten by a new generation, the Soviet past is pushed aside by history as an extravagant aberration, bad dream, full of embarrassing details we are ashamed to remember. Soviet Russia is, by measures of marketability, *passé*, old hat. But what can it tell us about ourselves, regardless of time and space? What kind of seeds—or dragon's teeth—did the Soviet idea plant into the future for us all?

People who inhabited the past told us about their life in letters, diaries, memoirs, poetry, and novels. The documents of time could be researched and commented by historians but fully understood only by the contemporaries. My perception of Russia is that

of somebody who did not belong there, was happy to finally flee the land, and never intended to come back. In my new existence, so much different from the past, I see, however, that there is no escape from the continuity of the world and the unity of human nature. Russian past is a **prophesy** that cannot be fully understood by contemporaries and compatriots—as nobody is a prophet in his land—and is addressed to a larger world. By definition, ironically, nobody is a prophet in his time, either.

I cannot see Russia with Russian eyes. There is a tectonic break between my past and my future: my past was tied to one place, while my future is tied to a different and larger place. Believing in the non-spatial nature of patterns of history, I am trying to see the Russian past as an American future. This mental contortion is troubling and even painful to myself. It is unnatural. But I have no links with Russian present and future and I hold on to the only future I can think about: the future of my American grandchildren, while the only distant past I have is the Russian one, already being washed away by my long enough American past.

Having had a furtive e-glimpse into modern Russian arguments about Russian czarist past, recent Communist past, and prospects for the future, I got an awful feeling that Russia, at least on the Web, has been brought back to its intellectual infantilism and is playing with the antique pieces of her historical Lego with complete disregard of historical experience. The thousand years of sequential historical sediments have been stirred up in the flow of time as if there were no time elapsed at all. I had recoiled from the Russian search engine and returned to the only firm ground in Russian history I have ever known.

My primary source for in-depth pre-Soviet Russian history has been Vassily Kluchevsky, Василий Осипович Ключевский, (1841-1911) He was a compassionate analyst of Russian reality who had not subscribed to the sniveling nationalistic and fist-brandishing supremacist visions of his native land. As for the Soviet period, I have the first-hand knowledge of its major part.

What is so special about the only other superpower of the past?

Here is my largely obstructed and narrow snapshot of Russia by February 1, 1987, my last day in Russia.

1. Russia has been the largest reservoir of Judeo-Christian ideology in Eurasia

I use the word **ideology** instead of **religion** for two reasons: for a while, religion disappeared from Russian landscape. But religion is an ideology and even the Communist ideology preserved important features of Judeo-Christian religion: virtue of hard work, the promise of a paradise, and obligations to your neighbor, community, faith, and the authority, whether in heavens or as the powers to be. An examination of Communist ideology and Christianity side by side is an intriguing topic, which is beyond me. The Russian orthodox Communism definitely combined the stern non-Orthodox Protestant ethics with the dogma of even more un-Orthodox papal infallibility and it had the glaring gap between ideals and reality typical for any religion.

The elimination of God from ideology in the Soviet times left the frame of monotheism intact. As result, pluralism has been a mostly alien idea to an average Russian. There could be only one right thing for all (правда, *pravda;* it is not just truth, for which there is also a different word, *istina,* but, in its second meaning, the guiding or ruling truth). Whoever does not think like you is wrong, or, worse, your enemy. There is no God, but, still, there is the truth and justice, *pravda* above this world.

For a long time Russia was separated from the West by its Orthodox version of Christianity, prevalent for the first 1000 years of the religion, in which the czar is the actual head of both the state and the church and his power comes from God. Unlike the Chinese *Mandate of Heaven,* however, the Czar is always good and just by definition and does not require either approval and acceptance by the people or account before Heavens.

For five centuries the Russian church regarded Russia as the Third Rome: the only world custodian of Christianity and the successor of the fallen Roman Empire of Constantine the Great and Eastern Roman Empire.

I call Russia a **reservoir**, but what it means except the preserved system of ideas? Imagine two hypothetical countries, Novia and Oldia, with similar sets of ideas in our modern world. One has very porous ideological borders and high level of unrestricted flux of all kinds. The other is much more homogeneous and conservative. Let us not prejudge that, but if the old set of ideas has been replaced by a new one in Novia, at least Oldia can supply missionaries or mercenaries to restore the old ideology, for better or worse. Otherwise, the genetic pool of Novia changes forever. Whatever we think about the messianism of George W. Bush, his idea of American democracy is a kind of Oldia watching over the erring Novia. The Russian idea of Communism was the Novia winning over the erring Oldia. The political Islam is, at least in pretense, Oldia over Novia, which only confirms that flipping the old and the new leaves the pattern intact. Democracy or theocracy—it depends on the supply of energy. But I should quench my flippant ruminations right here.

2. Russia never knew stable democracy and political freedom for a single year.

There are very few **very large** nations on Earth with **old uninterrupted** traditions of statehood: Russia and China, to be exact (there are smaller, too, for example, Iran, Japan, Thailand), both with dense population in the plains and both with the heritage of authoritarian rule sanctified by the heavens.

At a closer look, Russia and China, with all their similarities, are very different—religion and soil are probably responsible for most of the contrasts—but let us take a look from afar. The strong central power made possible a consolidation of the **introvert national character** and the centralization was able to spill easily over the flat surface. Large plains were navigable horseback in all directions, more like water than the land, while the big cities stuck to water. In an anti-symmetric fashion,

probably, American democracy was spilling, horse driven, over the Great Planes until the nineteenth century when landscape did not matter anymore.

Russia did not know democracy, but what did it know? Between at least 1700 and 1861 it was full blown slavery (*крепостное право*), called serfdom in the West. Its legal form and practice was a real, not metaphoric, but literal and brutal slavery, when people were bought and sold with separation of families and severely punished for disobedience and for fleeing the master. The slaves in the core Russia (not on the periphery) made up the majority of all peasants and were not in the least racially or religiously different from their masters, although the precipice between the two ways of life was of an almost biological magnitude.

For a much longer timeб the Russian peasants, whether free or enslaved, had a communal form of life in a rural settlement (*obshchina*, община). Land was distributed according to the needs of the members of community. It was not considered private property and if a free peasant wanted to quit and move out, he had to leave his land behind. The communal land could be a collective property of free peasants, private property of the landlord who owned the serfs, or state property in case of the so-called "state peasants" owned by the state.

There are conflicting views about the origin of this system destroyed **by the czar** only in the beginning of the twentieth century, not long before the Russian revolution. The Communists, however, who had come to power with the promise of private land for all peasants, took all land away and restored the old Russian commune in a new and much harsher form out of which no one could move away. They abolished private land altogether, as well as anything smelling of capitalism and private initiative.

3. Russia has been the largest country in the world, always very much conscious of its size, power, and mission

As for the size, it is obvious. As for the mission, while under the czars it was the burden of guarding the true Christianity, under the Communists it was to spread the principles of true social justice over the entire world. I am convinced, however cynically, that any active ideological mission, like spreading Christianity, Communism, Democracy, Islam, or any other system of ideas **by force** is always a cover-up for a deeply seated drive for power and wealth. More specifically, it is a drive to secure political power of an emperor, dictator, clique, politburo, president, sheik, etc. The **subconscious purpose of a messianic drive is to increase the geographic distance between the seat of power and the borders**, i.e., between the domain of the power and the external world full of uncertainty, hostility, threat, and alien ideas. It has always been done either by direct conquest or, more appropriate for new times, creation of voluntary alliance or a circle of dependent satellites.

NOTE (2016). It is clearly seen in the Putin's war against Ukraine.

Why does it always fail? The simple natural reason is that by applying a c**oncentrated power** to a **larger area** dilutes power. This is the paradox of expansion: power over a growing area evaporates like a thin layer of water. This is not so with the power of immaterial ideas. **The delocalization (dilution)** of power, as chemist would say about energy, is what Paul Kennedy called overextension, attributing to it the decline of great powers. Naturally, **concentration of power** depends on the ratio of the sources of energy to size and complexity of the system. Unlike chemistry, however, it depends also on the intellectual resources and their use by the government, which can be miserably low, as the current era illustrates. .

The main Russian idea has been repeated through centuries in different word triads which always meant the same: God, Czar, and Fatherland (*Bog*, *Tsar*, and *Otechestvo*), Russian Orthodox Christianity, Imperial Absolutism, and the primate of Russian Nation (*Pravoslaviye*, *Samoderzhaviye*, *Narodnost*—none has an exact English counterpart, whatever the dictionaries say), and Communism, Party, and Motherland. In short, common ideology, autocracy, and Russian (Soviet) supremacy.

Soviet Russia had a mission to improve the erring Capitalist West and it was the only just and the most powerful (i.e., military) force to do that by spreading the Soviet style democracy. It is my impression—there were no polls in Soviet times—that very few Russians cared about improving the outside world or believed that it was possible.

As Kluchevsky noted long before the Russian Revolution,

> The rich have bad influence not because they are rich, but because they make the poor to feel poor. If the rich were destroyed, the poor would not be richer, but they would feel less poor.
>
> "Богатые вредны не тем, что они богаты, а тем, что заставляют бедных чувствовать свою бедность. От уничтожения богатых бедные не сделаются богаче, но станут чувствовать себя менее бедными".

Without the rich, the Russian poor, i.e., everybody, felt certainly less poor for as long as they were prevented from traveling beyond the Iron Curtain and the display of wealth could lead only to various problem.

4. An unprecedented social transformation happened in Russia between 1917 and WW2

During this time, millions of people of the pre-1917 upper and middle classes either flew the country or were uprooted, expropriated, and exterminated as **classes**, physically or politically, following a Marxist doctrine of eradicating private property

other than personal possessions. I cannot recollect any episode in world history comparable with this class extinction, although the French Revolution was a predecessor and an inspiring example. As result, proletarians, i.e., people who had no independent sources of income and completely depended on their employer, were declared the ruling class, while peasants became a class one step lower. The white collar workers, including educated professionals, scientists, artists, writers, and actors, were tagged not as a class but as a layer or thin strata (прослойка) of society, required to serve under the *dictatorship of proletariat,* the buzzword of the revolution and the major Soviet inanity, gradually abandoned.

Immediately, a new ruling class began to take shape, with a new czar at the top. He became the single actual **employer** and *de facto* **owner**, of all citizens of Russia and the land under their feet. People in the West use the term **totalitarian state**, following Hannah Arendt, in mostly political sense. Totalitarianism, as anything complex enough, has degrees. The Soviet totalitarian state was absolute because everybody without exception, received the daily bread from the single employer, from the politburo to the peasants that grew bread from the earth. The employer could not fire you but was able to shift you to a new unpaid job behind barbed wire.

I have an impression that the Western public missed or underestimated the economic basis of Soviet totalitarian idea. It was not so much the political oppression as the impossibility to make a living without being employed by the state. Looking from a different angle, the Soviet system was on the borderline between the animal pack and a tribal society: the members did not elect the leaders of the pack: the strongest took the power.

Any resistance to the new order, whether real or either suspected or falsely reported, was cruelly eradicated. The power of the new class, or *nomenklatura*, the privileged, was not in money, land, and means of production but in subservience to the top party leadership who rewarded loyalty above all. Although the way to *nomenklatura* was open to the rank and file party members, and the way to the party was open to the blue collar workers first and the rest next, by the 1970's it was already a minority class in itself, with an exclusive way of life, however far from the lifestyles of rich and famous abroad. Increasingly, money was becoming the preferred medium of exchange in addition to bartering goods, favors, and power. The next step up could be only private property. Within the Soviet framework, the power to make an administrative, managerial, judicial, or service decision was a surrogate of private property. If it looks like the common American corruption, it is not quite the same. One completely legal and normal decision could be exchanged in a deal for another completely legal and normal decision. This looks more as the common business. In this curious way, underground economy merged with underground politics.

The Soviet way of life was a direct consequence of limited and underdeveloped production, total scarcity, stressed supply, and enormous demand. It is an example of what happens to an industrial society when productivity for whatever reason has no chance to go up. Remembering Russia, when I think about what is going to happen with America if the energy becomes scarce, I come to the conclusion that, the obvious

option of a war for the resources aside, the political system has to shift on the scale toward the authoritarian end. Unfortunately, nothing pushes the society in this direction as strongly as war. The simple reason is that some force is needed to keep the pressure in check during the **transition period**. Then a new generation gets used and adapts to it, as the Russians did.

Somebody has to remind the new generation about the past, but with time, such reminder can come only from the outside, as it was coming to Russia with BBC and the Voice of America. See about Novia and Oldia above.

> **NOTE** (2016). Today, when the world is awash in oil, the energy does not seem to be a problem. But there should be also the spiritual energy of society which does not seem to grow. Besides, the use of energy needs a thermodynamic sink for heat known for the public under the name global warming.

It is hard to find anything as radical in world history as the Russian transformations. It is also difficult to find a more traumatized national character, about which Kluchevsky noted that the Russians were more inclined to look back than to plan ahead. With this kind of history, its next turn is always expected as an act of God, against which no insurance exists. No wonder, Russians have always considered themselves the people unlike any other. The attraction of the West, from which most of science, technology, and powerful cultural and ideological influences came, was countered by xenophobia, chauvinism, and rather low key and inefficient, by modern standards, propaganda. Today this kind of schizophrenia is best exemplified by some Middle Eastern societies. Nevertheless I believe that no old and big nation on earth is spiritually closer to the West than the Russians. I also wish to testify that the Soviet life I saw around had a rather high degree of normalcy and stability. Russian mind adapted to its regenerated after mutilations body.

By Western standards, Russia was an oppressed society. It was certainly not what the Russians had to mull over every day. Between 1956 and 1983 it was a relatively stable society where life was governed by simple rules and normal human aspirations. People were unaware that they were poor, enslaved, and oppressed. This is a fundamental distinction that tests the definitions of slavery, poverty, and oppression. It is certainly not the same as an oppressed group, class, or ethnicity. **The absolute majority of Russians regarded their life as natural.** There was a good deal of civil order, communal services, criminal justice, and common purpose, in spite of gradual erosion by corruption and hackwork.

The very narrow range of choices, attractions, distractions, and focal points of attention created strong emotional attachments and repulsions. Russian life, with its poverty, high urban overcrowding, and great cultural contrasts between two big and vigorous capital cities (Moscow and Leningrad, protected from incomers) and the

bleak provinces (from which the inhabitants could not move out) had an emotional intensity of a Shakespearean drama on private scale.

According to my observations, the openness, sincerity, genuine interest of Russian people in each other, mutual support, strong friendship, selfless love, and emotional involvement made a pleasant, although sometimes burdensome, contrast with American life for the Americans who happened to spend significant time in Russia or among Russians at remote places, such as Antarctica.

Russia was a pro-intellectual society. With work and business being often routine and stagnant, art was usually important. A rare talented novel or a poem that somehow could break through the asphalt of censorship was an event. Private property, personal wealth, advertisement, unemployment, competition between institutions and enterprises, checking accounts, and many other outlandish things were unknown, salaries fixed, size of an apartment limited, choice of place of residence restricted, and competition for a higher position tightly controlled. And yet the general culture of the society was essentially European and unquestionably Western, less so in the backward countryside and alcohol-saturated blue collar (actually, black collar) apartments. It was my personal impression that the overwhelming majority of the people did not like the party members and were ideologically indifferent.

To live as in the West—minus capitalism, democracy, and pluralism, but even better—was an official social goal. When people are consumed by small gnawing problems, like to find a decent pair of shoes, they need either to create an internal justification of the meager existence or ignore anything but the immediate goal. In a way, it was a society of hunters and gatherers—for food, clothes, appliances, and connections—in the life that at all levels, except strictly private decisions, was planned by the state. The hunter-gathering habits prevailed in industry and agriculture, where scarcity of supply was planned. Bartering was a typical way of doing business.

If you could not buy a decent pair of shoes, the scarcity was planned, too. And yet if you carefully avoided unorthodox political remarks and conflicts with authorities, this life could be lived in a harmony typical for any established human society in equilibrium with its conditions. When the equilibrium was shifted by the prospect of space wars, military-industrial decay, and the heroism of dissidents, the system was half doomed. The other half of the doom came from the accumulation of illegal wealth and the fusion between the ruling elite and professional criminals.

Communism in Russia was abolished from above, same way as the old Russian slavery had been abolished by the czar. The process of abolition took 130 years: from 1861 to 1991, but the authoritarian streak of Russian history has not yet been broken.

The images of my past Russian life tell me of an immense ability of human society to adapt to any system. Human condition spreads over the full spectrum of social forms from tribal life in the jungle and desert to the wasteful culture of disposable things and

ideas. People can be happy in any such system if their lives and loves are not threatened and if they do not remember better times.

The most difficult thing for me was the mind-boggling **inconsistencies** of Russian life, ignored by the majority of people. The Soviet life was a cluster of obvious contradictions: "free" elections with a single appointed candidate, capitalist ideals of prosperity without capitalism, "socialist democracy" without freedom of movement **inside** the country, not to mention across the borders, the "first free society" in history with total vacuum-tight censorship, "dictatorship" of the proletariat, i.e., people who have no property to stand the pressure of the state, etc.

Once I had to buy a locally made pair of shoes: the left and right shoes were made of different leather, but after a week both looked like they were ten thousand years old and stolen from an archeological exhibition.

It is not such a big deal to wear ugly shoes. You cannot have broken logic, however. The violations of elementary logic coming from a Yale graduate, such as the President's stubbornly repeated senseless arguments for the Iraq war, have been for me among the most troubling *déjà vue'*s of Soviet life. It is the acceptance of a flagrant in-your-face irrational contradiction by a significant part of population that appears to be the first symptom of a serious disease of a democratic system. Lie can be given the benefit of doubt, but irrationality cannot because it is instantly demonstrable. People do not start believing in a lie repeated thousand times, as the Nazis and Soviets hoped: they simply cease to notice it.

There is at least one positive lesson from the history of fallen empires, dictatorships, and oppressive societies: after a period of calamities, they enter periods of reconstruction, revival, and stability—the Phoenix effect—waiting for the next fire. This is the true natural mechanism of history, which is tolerable on the condition that the periods of peace are substantially longer than periods of turmoil.

But who or what sets the fire? This is something that I keep thinking about. Chemistry gives no clue because natural sciences do not deal with human or other autonomous agents. Galileo is absent from the physical equation of the free fall. There is no personal imprint on a new chemical substance that a chemist designed and materialized. An intermediate result is at the very end of this essay.

What has Russian experience to do with America?

Turning to America, it is impossible to find a more optimistic and energetic nation, in spite of all failures and whatever the global polls say. According to my personal and, most probably, immature impressions, disregarding all other sources, what makes America unique is:

1. The overwhelming belief that your position in life depends only on you.

To look at it from a different angle, political ideas do not feed you, but your hands, mind, personal freedom, and equal opportunities do. **Whether the belief is justified or not, it does not matter, but the belief itself does.** The all-American secular faith includes an assumption that there are no legal and systemic obstacles to your success. You are your own boss (i.e., Lord). If there is a secular devil that rigs college admissions, for example, you chances to have your way through a different avenue are very good. Unlike religious faith, the American idea has lots of evidence to support it.

But what is success?

2. The predominant measure of success is money.

This drastically simplifies the social design, so that practically anybody can enter the competition and see personal standing. But it makes competition the way of life. The success in competition is not always measured by a monetary kill. It consists in the score of successive wins and losses, as in a sports tournament. The money comes as the reward at the end of the season. I would say that American life is a **game** for money. This makes life stimulating and exciting, like a perpetual childhood. It is a youthful and optimistic society. It makes you a compulsive gambler and, as many Europeans note, perpetual teenager, but what to make of it, I have no idea. I definitely have nothing against it.

But what about power?

3. The measure of power is the sum of money (private or public) one can control and spend for a single purpose.

Thus, American president earns a moderate for his status salary but can waste the biggest sums of money on earth. If George Soros wants to fight the Republicans, he does it by the money he can throw in the campaign ring and not by clock-and-dagger methods. Bill Gates sprinkles the nasty germs in Africa with money, the best biotic/antibiotic, itself not sterile, though. A stock of bombs costs money, but if you can drop a lot of it in a go, you have real power.

What can counter the strength of money? Brutal force and threat to life, freedom, and pursuit of happiness. This takes money, too, of course, as the story of state and stateless terrorism shows. But the cost effectiveness of money for personal, social, or national causes could be very different depending on whether civil, military, or terrorist methods are used, i.e. whether you are grabbed by your wallet or by your throat.

The cheap price of disposable human life compensates for sophisticated costly military technology. This is crystal clear in Iraq. Do we have the guts to repeat Hiroshima and Dresden in time of war?

What strikes me in the Code of Hammurabi, where punishment by death was as common as fine, is how cheap human life was in the name of justice. It looks like both money and life were considered species of the same genus. In the former land of Hammurabi life is cheap again, equating murder with power.

The terrorists do not have money to blow up a plane a day. Their power is very limited. If we cannot win, it is because we are stupid, not because we are powerless.

But what about work?

4. Hard work is the way to success.

There is nothing to add to this point. In America, this truism is also a belief, an article of faith, but as any other article of the American faith, it is well supported by evidence. To be more accurate, hard work is the **necessary but not sufficient** condition of success. So is money regarding power, so is your willpower regarding success, etc. The very **absence of a single or composite sufficient condition** is what I would call **social fairness**. In this sense, Communist Russia had a great degree of social fairness. The problem with Soviet Russia was that there was a **single sufficient condition of a devastating personal failure**: the political disloyalty.

While many aspects of American pop culture make me cringe, while I see definite signs of regression and erosion in my twenty years in America, while I am terrified by the non-Americanism of the Bush politburo, while I am sickened by the aggressive radical Christianity on the offensive, the social fairness of this land is my strongest overwhelming positive impression and this is why I keep a small American flag on my desk and keep worrying about American future.

If the difference between old Russia and modern America is so enormous, how can we speak about similarities at all? As an answer, I have to remind that I am speaking about systems separated by a gap in both time and space. One is dead, the other is in a transition to a different and still unknown state. Under such conceptual strain we have to search for similarities hidden in the cracks between big blocks of differences.

Answers to important questions never lie on the surface: otherwise they would not be important. But the most important questions do not have answers at all.

I am not yet ready to discuss the question of the direction of the American Evolution. I am overwhelmed by the flood of pessimistic assessments and predictions coming from intense thinkers (Paul Kennedy, Niall Ferguson) as well as from the fuming sewers of the Web. I should better wait until the electoral test at the Midterm Elections, 2006. Pessimist by nature, I would still bet on America. I need the showdown.

Here are some off the cuff (and some off the wall) similarities between past USSR and modern USA as I see them. Some of them have been well discussed in literature.

1. Reliance on military power

The reliance is contradicted by the experience in Vietnam and Iraq for the USA and in Afghanistan for the Russians .

2. Global ideological messianism

"We are the best and the rest should be like us. Convert, infidels!"

3. Schizophrenia

See above. The symptoms of a major American schizophrenia can be found on the right, around the pro-life ideology, and on the left, in the clash of national interests and humanitarian ideals. Yes, go to war but do not kill.

4. Education and access to elites

Decline of education is a certain way to imperial demise. This question deserves a separate consideration. In Russia the education was hampered by politically and ethnically discriminatory college admissions. It looks like America learns to inhale the same suicidal stuff. See Daniel Goldin, The Price of Admission: How America's Ruling Class Buys Its Way into Elite Colleges — and Who Gets Left Outside the Gates. Crown Books, 2006. This is a true meritocracy-eating bacteria that may spread over the society. The silver spoon factor contributed to the entire Bush era. There are, probably, much more weighty eroding factors at work in education, not yet fully researched by anybody.

See the biennial "Measuring Up 2006: The National Report Card on Higher Education"

5. Territorial segregation

Soviet Russia (USSR) was multi-ethnic and multi-cultural federation with historical territorial segregation: the most westernized Baltic republics in the North, the Muslim republics in the south, the American style melting pot of Siberia in the East.

While the cultural and ideological balkanization of America has been already registered by many observers, it is getting more and more visible on the map. Territorial segregation was the main factor in the peaceful dissolution of the Soviet Union: most borders were clearly drawn. The map of the USA is already scored at many levels—from party color to longevity—and the country has already had a precedent of an earthquake.

6. Loss of privacy

This is a remarkably sovietesque development. I remember a visitor from Russia in the 1990's who, when I showed him my American telephone bill with all call records, immediately commented: "So, you don't even need any KGB [secret police, state security]."

I testify that the level of privacy in Russia under the watch of KGB was incomparably higher than in modern USA, if only you did not conflict with authorities or otherwise fall into focus of attention.

The loss of privacy in America has nothing to do with the Republicans. It has everything to do with the spontaneous development of technology and, as I believe, will be the best grease in case the American future slides closer to the Russian past.

7. Mythology 8. Party discipline 9.

But this will do. The similarity between the two systems are, of course, completely dwarfed by the differences, which I do not mention (they are well known) except the following three most sharp contrasts:

1. Dynamism.

Unfortunately, the eight years of the Bush presidency seem as sleepy, viscous, and wasted as the eighteen years of Brezhnev. Well, I am going overboard, sorry.

2. Wealth.

The evolutionary importance of wealth is that the possessor can afford to lose more than somebody who bets on the last dollar (or ruble). I am not qualified to judge this aspect of the American Evolution. I would only remind with sadness about the convertibility of human life and money in the power game. This will give some global perspective regarding the power of old Russia and new China, not to mention the Islamic terrorism whose cash wealth is stored in the currency of death.

3. The magnetic attraction and magic of America is a difference of a non-rational nature for those who, like myself, became unhappy in their native land. One can be unhappy in America, too, because unhappiness is like the turtle's shell, but the laws of gravity are different here and you can even try to fly with the load on your back, which you cannot shed. This is the best lasting stock index for America in the world market of civilizations. Beware of its split.

Personal note

Oriana Fallaci, a bright and lonely star of modern world, who died on September 15, 2006, left a striking description of the American magnetism in a language that could never come from a born American (in an article in *Il Corriere della Sera*, September 29, 2001).

In her inimitable, heart wrenching documentary novel "*A Man*" (1979) Oriana Fallaci lashed out (on p. 222 of the Simon & Schuster edition of 1980) at "the terrible Leviathan, the great monster, the self-elected champion of democracy" America for anti-individualism that is common for all tyrannies "of right and of left." This does not contradict her eulogy after 9-11, however, because **all states are anti-individualistic and anti-Quixotic**; this is exactly the idea of a state.

The great monster met the huddled **masses** yearning to breathe free at Ellis Island, but Don Quixote could be, probably, turned back. And yet in America there is a place for Don Quixote, too, because once the great monster lets you in, it kindly forgets about you.

Anyway, a long time passed between 1979 and 2001. It was a different era. Since then, Oriana Fallaci, who was not a US citizen and had a house in Manhattan, happened to spend a few years under the protection of the Leviathan, while my sister in Russia, whom I had not seen for twenty years, was denied an American visa in 1999 because she could not prove that she would go back to Russia after having visited me. She became an entry refusenik in USA while I was an exit refusenik in USSR.

Oriana Fallaci's diatribe against the American Leviathan was triggered by an American refusal of visa to Alexander Panagoulis, the Greek terrorist-hero and her lover, in the mid 1970's. It was the period when the Soviet exit visa refusal to the Soviet Jews was about to hit me and my family in 1979. Visas are the pebbles in the shoes of freedom.

A monster is a monster, whether Soviet or American. That was the bitter lesson I learned after the American visa was refused to my sister. But that was not all that I learned. I am still a fortunate Don Quixote who had sneaked in with the crowd and found his place. And of course, having growled back at the monster, in the same book (p. 361), Oriana Fallaci writes about New York: "there I found an environment in which I had always felt at ease." That the Americans are still able to keep reasonable distance from the Leviathan of the Government, contrary to Thomas Hobbes' vision and Communists' aspirations to make everybody a little screw in the national machine, is part of American magic.

Conclusion

I believe that all societies are built from the same set of Lego parts (ideograms), as all living organisms are built of the same amino acids, nucleotides, and a team of biochemical tricksters known as enzymes. A chemist is interested most of all in transformations of one structure into another, even if the final result is yet unknown. The science of chemistry, like the still hypothetical science of political sociology, is about stability and transformation of structures. Like a politician, but with a guaranteed success, the chemist builds a structure that was floating in his mind or destroys another, reserving the ability of reconstructing it. This determinism and reversibility are denied to human life, so that chemistry of molecules and chemistry of history overlap only partly. **They overlap much more when we consider irreversible and non-equilibrium biochemistry**, from which, after all, human history once emerged. What does not overlap is the uniqueness of acts and individuality of actors. And so we move from stony and bony facts to ethereal patterns. We have to part with determinism, but the game of life—and history—will still be worth playing.

I conclude with a question.

What was the main reason that the system as unnatural as Soviet Russia was able to **stabilize** after it had emerged from the post-WWI poverty and destruction, Russian historical heritage, and the Marxist ideas?

My answer is:

It was mainly because of its very unnatural and unprecedented properties that turned all the so called "civilized" nations of the world against it. In other words, the repressive Soviet totalitarian society and the permanent martial law were a natural and common **response to hostile environment**. The gradual recognition of Russia by the world, it **inclusion**, was the very beginning of the slow process of the decline and dismantling of Communism.

As a very tentative hypothesis, I consider the "sovietization" (just a metaphor!) of modern America, or, to be more accurate, a trend to revise and make tougher its constitutional foundation, to be the result of the rising violence, hostility, antipathy, or coldness of the rest of the world. America, whether justly or not, responds to that in a hisorically quite traditional way.

In general, what leads to decline and degradation? Growth and success.

Nevertheless, let us celebrate growth and success and let the old Don Quixotes fret over the suggestive shadows of the future.

NOTE 1 (January, 2007). The Republican Revolution is over, but the future of America is uncertain.

The Western hope for a civilized Russia has been deeply dented. The Russian history begins to repeat the roller coaster of the French history after the French Revolution: ups and downs of the authoritarianism, or, in a different language, fading aftershocks of the earthquake. Unfortunately, Russia does it in the crude gangster style.

Russia and America have more common interests than dividing issues. It is fashionable today to quote Winston Churchill who said that America would do everything right after having tried all the wrong directions. I consider it a historical compliment against the background of many nations always doing something wrong, never doing anything right, or never doing anything at all.

There is one big point of similarity, which I am not sure anybody has noted: both Russians and Americans despise the government in their hearts and love to cheat on it. What is called American individualism is called Russian anarchy.

NOTE 2 (March 2007). The recent developments in Russia, the murders, the München speech of Putin, and his proclaimed goal of "going beyond oil" are best understandable if

expressed in German. They sound to me like Russland über alles, the slogan that has the greatest potential to bind the Russian people to their Führer or his heirs. Putin uses the main Communist and Nazist trick: substitute the promise of great future for the uncomfortable reality. Nevertheless, I am for active and positive policy toward Russia, however troubled I am by the *déjà vue*. By accumulating wealth and Western education Russia has a chance to become more civilized. Civilization means putting personal grand future above the national one. This is why all grand civilizations perish. I may be wrong. Foreseeing a trick of substituting grand American past for bleak American future, I wish to be wrong.

NOTE 3 (February, 2009). It is impossible to understand Russia without the story of its Gulag: the giant slave labor enterprise launched after the Bolshevik Revolution in October 1917. ***Gulag: A History***, by Anne Applebaum (Anchor Books, 2004) is a unique definitive research, brilliantly conceived, written, and deeply felt. This book made me feel sick, I had nightmares, but I could not drop it. It told me more than anything else about Russia, my native country, although I had lived there for 50 years and even was myself swallowed by Gulag for three years. I need to remind that Goulag was the second enterprise of this kind. The first was the Russian system of serfdom, abolished only in 1861. Gulag has not been abolished and is still used as an industry and a political weapon.

2006

POSTSCRIPT (2016**)**: Putinism. Russia is an aggressive mafia state. Trumpism. The shadow of Donald Trump covers USA from coast to coast. Having re-read this Essay, I have made a just a few minor corrections. But ten years after 2006, I have new worries reflected in my last essays [12 MB] and other parts of spirospero.net. Inequality. Instability. The war in Syria. Terrorism. WW3. Pessimists have imagination. Optimists have beliefs.

Putinism is already an entry in Wikipedia. I repeat here a **NOTE** (2016) from Essay 45, The Place of Philosophy in Science:

> Indeed, Napoleonic complex is a pattern well beyond French history. The pattern of a dictator with continental or, in our days, global power is alive and well. Some people like me, who have lived long enough, were contemporaries of Hitler and Stalin. The Western analysts are trying to take apart and look through a magnifying glass at the inside screws and gears of Putinism, while it is the view from a long historical distance that matters most: it is one of the kind nuclear dictatorship of a global caliber that remembers its victory over Napoleon and Hitler, as well as its defeat by a nuclear democracy of a global caliber.

Essay 45. The Place of Philosophy in Science

In my youth I was strongly attracted to philosophy because I believed it could give me the understanding of the world. With time—and rather quickly—I realized that philosophy could not offer anything of the kind because one philosopher's creation was immediately snatched out and torn into pieces by another one, who wrote his own treatise, usually of great length, with new terminology, and on a different array of topics.

Close to the very beginning of philosophy, Plato addressed the audience in plain language because his method was a dialog from a hilltop with a common mind below. Aristotle turned dialog into monolog, which is still readable because he did not address an audience of other philosophers, but took care to list their views. Some philosophers, like Descartes, maintained a dialogue with themselves, which is, by the way, a part of scientific method of doubt and check.

> —And further, as I sometimes think that others are in error respecting matters of which they believe themselves to possess a perfect knowledge, how do I know that I am not also deceived each time I add together two and three, or number the sides of a square, or form some judgment still more simple, if more simple indeed can be imagined? (Descartes, First Meditation).

Others argued with imaginary opponents.

> —Therefore a being absolutely infinite, such as God, has from himself an absolutely infinite power of existence, and hence he does absolutely exist. Perhaps there will be many who will be unable to see the force of this proof, inasmuch as they are accustomed only to consider those things which flow from external causes. (Spinoza, Ethics, Part I, Note to Proposition XI)

Kant and Hegel tried to elaborate a blueprint for Everything, as if they created this world up to the smallest detail, including their own presence in it. But with Heidegger and Sartre I felt the end of the road lost in the thicket of words. I got an impression that modern philosophy became what it was in the very beginning: art. As art, it was for human enjoyment, but with a modern shift of the emphasis from esthetic, logical, or otherwise "nonprofit" enjoyment to a pragmatic enjoyment that could be measured in some way, often monetary one.

The distinction of our postmodern world is that what has no quantitative measure has no value. In the Antiquity, value was what could not be expressed in numbers. An ancient

king could boast a stela with the numbers or killed enemies, or a list of his glorious epithets, but there was only one king and he needed no other values.

Thus, modern visual art, is usually, but not always, a handmade object that sells like art, is treated, entitled, presented, exhibited, explained, and praised like art, but may not look like art at all (see Essay 60, Art and Nexistence). Modern art needs a body of mediators or middlemen between the author and the consumer and so does philosophy, especially since the German classical philosophy. The need of interpretation is something that brings philosophy close to religion for its lack of consensus. Plato today may need comments but not necessarily an interpreter.

Regarding philosophy, there has always been a pragmatic expectation: a young person looks for a guidance or explanation, as I did. Today the young person often finds it in music and videos. Those whom pop sources failed, which becomes apparent by mid-life, may turn to spiritual preachers, self-help pushers, and snake oil peddlers. By my mid-life I lost all my expectations from philosophy, but not the interest and reverence. Philosophy became another mystery. As a whole, it wants to say something, but what?

Under the influence of Ulf Grenander's **Pattern Theory**, I arrived to a new pragmatic appreciation of philosophy.

In order to share it, I have to start with Pattern Theory.

In short, Pattern Theory is a mathematical way to represent complex systems **of any nature**, including life forms, societies, and doctrines, as structures (configurations) built of atom-like elements (generators), similar to molecules built of atoms in chemistry. The revolutionary step made by Ulf Grenander, himself a Renaissance man, was to attribute a measure of probability to various structures, depending on the properties of their building blocks and bonds between them. As a chemist I was naturally captivated by this typically chemical view of the world. I had some vague ideas of this kind long ago when I lived in Siberia and thought about the remarkable properties of the Soviet totalitarian structure and its prospects.

Ulf Grenander's work was the richest treasure of ideas I had ever found. My entire web site, including **simplicity**, **complexity**, and **poetry** sections is nothing but a chemist's view of the world, strongly influenced after 1980 by Pattern Theory and further by personal encounters with Ulf Grenander.

Poetry finds its place in the picture because it is based on metaphor: representation of one structure by another within the same pattern. Such representations allow for linking very complex intuitively comprehensible objects and images with much simpler ones, directly perceptible or more familiar.

Analogies and metaphors (I do not see much difference between the two) have always been frown upon by exact sciences, although physicists used them in discussions and popularizations. Yet nobody seemed to notice that the phenomenon of analogy, which often suggested a mathematical similarity, and metaphor, which looked like a swirl of poetic imagination, was a property of the world and not just of our perception of it.

Complex systems, however, such as life, society, culture, mind, and individual internal world of a human being, are not completely indeterministic—there is a lot to be tackled with probability theory—but they contain unique singular subsystems that exclude statistics. Indeed, there is one and only Napoleon. Pattern Theory is the only way to pull such complex singular systems into the orbit of science, thereby liberating sciences from the tyranny of exactness and humanities from the infamy of subjectivity (so much valued in art).

> **NOTE** (2016). Indeed, Napoleonic complex is a pattern well beyond French history. The pattern of a dictator with continental or, in our days, global power is alive and well and some people like me, who have lived long enough, are contemporaries of Hitler and Stalin. The Western analysts are trying to take apart and look through a magnifying glass at the inside screws and gears of Putinism, while it is the view from a long historical distance that matters most: it is one of the kind nuclear dictatorship of a global caliber that remembers its victory over Napoleon and Hitler, as well as its defeat by a nuclear democracy of a global caliber.

I see my mission as popularization of Ulf Grenander's ideas outside exact sciences that are well known in computer science and are popularized by Grenander himself. Outside that area, however, they still wait for professionals open to new ideas. The difficulty is that the scientist who wants to explore this area has to abandon some fundamental preconceptions about his or her profession, namely, what constitutes science. According to my observations, the current shift to science as a business, in which the intellectual adventure is driven or restrained by considerations of investment and return, whether personal (in terms of career, attention, and money) or social (a promissory note of return will do), may hamper our integral understanding of the world and, probably, fundamental knowledge itself. Unlike the **knowledge** of science, which is open for all, but accessible to few, **understanding** is one's personal and inalienable possession, which can be shared with many.

> As an example of the postmodern atmosphere in theoretical physics, the sanctum of knowledge, see current arguments around string theory.
> Jim Holt, *Unstrung: Two Critiques of String Theory*, The New Yorker, October 2, 2006, p. 86. The critiques are: Lee Smolin, *The Trouble with Physics: The Rise of String Theory, the Fall of a Science, and What Comes Next?* Houghton Mifflin, 2006 and: Peter Woit, *Not Even Wrong: The Failure of String Theory and the Search for Unity in Physical Law*, Basic Books, 2006. More on the Web.

Nevertheless, I can present at least one reason why a better, however "underscientific," understanding of the world could give a great historical return. This world is too complex for members of a democratic society, as well as for its top elected leaders, to make rational decisions. A professional specialist is never elected because presidency, for example, is not a profession. Simplification of complexity at the expense of exactness is **exactly** the task of the pattern science as I see it. This approach is not quite new, however, and the example of biology illustrates how generalization serves for understanding very complex systems.

Chemistry deals with individual configurations. It is an exact science—well, to be exact, not completely and with a lot of approximations. What helps chemistry is that all the myriads of molecules of the same structure are, for practical purposes, identical. In biology, however, complex organisms within a species could be all different even if they are clones because of the individuality of experience. In the twentieth century we could watch the process of the invasion of exactness into biology, coming from chemistry. Molecular biology is as exact as chemistry, *exactly*. This makes biology an incomparably more complex science than it was in the times of Charles Darwin. But this makes it much more understandable for the people who have to make important decisions about themselves, their progeny, or the fate of other people.

To draw an analogy from today to well beyond the horizon of tomorrow, this is what I expect from the pattern science of complex systems: understanding of choices and consequences of important decisions in complex historical situations by citizens of a democracy. Because if they are incapable of that, an equally incapable government will make the decisions for them, with some ancient book in hand.

Regarding philosophy, I begin to see a place of philosophy in a wider science.

Philosophy looks at the world under a powerful microscope and makes distinctions so subtle that they look irrelevant for our crude earthly life. Struggling with Aristotle, Hegel, Spinoza, Wittgenstein, or even, hopelessly, Heidegger and Sartre, we can see a forceful drive to analyze the depressingly complex world in terms of its tiniest **"atoms" and their "isotopes"** even if we cannot make sense of the significance of the fine differences of meaning. Thus, *becoming* is certainly *being* and *being* is obviously a *becoming*, but it takes a philosopher to show the difference and, moreover, to offer a menu with being-in-itself, being-for-itself, being-in-and-for-itself and being-for-another.

Hegel was the greatest both chef and gourmet of the cuisine based on the German verb *sein*, to be—a big leap from Shakespeare who knew only to be and not to be.

The opposite process of **synthesis** has not been as successful. While none of the philosophical systems has any advantage over another, except in terms of comprehensibility and compactness, philosophy has left us an inventory of atoms of reason and a registry of their properties for which we are still expected to formulate a chemistry. Unlike the atoms of the Periodic System and molecules made of them, the atoms of philosophy are immaterial. But so are joy, suffering, progress, decline, success, and failure. So is the reverberating in history past and the future that stirs up our hopes and fears.

From this perspective should be viewed my non-professional attempts to take Hannah Arendt under the chemical wing and my experiments with ideograms as atoms of **complex systems**—not objects, machines, institutions, goods, or anything tangible and for sale. I see them as atoms of understanding complex systems. I dream of young beginners in philosophy playing with this Lego.

2006

Essay 46. Postmodernity: Postmortem for Modernity

What is postmodernity? This Essay presents my personal intuitive view and cannot be a source of information about postmodernism (*pomo*, to distinguish it from the live postmodernity).

Postmodernity is the period of Western history from about 1950-1970 until today, as viewed by postmodernist thought concentrated mostly in European academia. The main source of knowledge about postmodernity is just the life around us.

There is no consensus regarding when exactly postmodernity started, what it actually is, and whether it even exists. It is certainly real in the sense that our perception of it in terms of pomo is real. But as we follow the postmodernist perception of the world, we lose the firmer grounds of pre-postmodern philosophy and sociology, very much divided into private plots, as well as the commons of science. I am not sure we have to leave the paved with stone grounds of logic, but this is quite possible because postmodernism, in my view, is art. It proves the point by self-exhibiting, acting on a stage, gathering a crowd, demolishing a piano, waving from the window, but not by reasoning. Art is a man-made interruption of the life routine. Art is as divine as the lightning and earthquake had been before we knew their physical mechanisms.

The very term "postmodern" is irrational because modern means present, current, and up-to-date. Postmodern means nothing but future—something that has not yet learned to nexist. Nevertheless, I believe that postmodernity is real and postmodernism is one of its derivatives. There is an indisputable change in the world after the WW2, especially accelerated by the advent of computers and information technology. History, like biological evolution, moves ahead step by step by partial deletions and additions to the roster of the social organization. Only with time we notice a loss after an addition and an elephant in the room after a loss.

A complete radical overhaul of an **evolving complex system** (ECS, X-system, **exystem**: life, mind, society, science, language, economy) is impossible. These systems move ahead by preserving most of its body while replacing a limb. The change is always local and I regard this as a basic definition of structural complexity. The concepts of **local** and **global**, however, should be thought in not geographic, but abstract terms: as topological relations. For more about this, see History as Points and Lines. We may speak about the cause of change as global in geographic sense, but in terms of X-systems this means **external**. Thus, global climate change or global exhaustion of oil resources are external

to an evolving complex system, unless we speak about a system of cosmic rank, like planet Earth.

Although postmodernism sounds like a postmortem of "modernity," recited over the autopsy of the rational world view of the Enlightenment and Industrial Revolution, "postmodernity" (what an ugly word) is a continuation of the previous human history resulting in some additions and some losses. There are always a few of them (the consequences could be many) and they can be described in terms of abstract concepts of function and structure, which I call ideograms. Thus, fluid circulation is a very abstract concept, blood circulation is less so, but still abstract, heart is more concrete, but only a particular observable heart of a patient is what can be called fact. Computerization is an abstraction. See **APPENDIX 1**.

Suppose, postmodernity is a new turn of history. Can anything really new happen? The answer is: when a **new combination** of old elements emerges, the history takes a **different** turn, but when a **new basic element of an existing category** emerges, history enters a **new** stage. See *manuscripts* in complexity. At a very high level of abstraction, however, far from the terminal facts, novelty becomes a rarity. Thus, the Industrial Revolution was a huge novelty, but from a distance it looks like the same kind of event (**pattern**) as taming the fire and making first tools. In a sense, there is nothing new under the sun, but in what sense is a matter of personal choice: it depends on how high you can perch and look down on the world of facts.

Here are my three points regarding postmodernity. They fall into one category—the consequence of growth—but of course do not exhaust the subject.

1 Techno-human symbiosis

We are a **symbiotic** life form. In this sense we are similar to lichens consisting of fungi and algae or some crabs living on a mollusk shell. We remember ourselves as *homo sapience* since we started using tools and fire.

We are the talking and manufacturing primates (*Homo faber*) in symbiosis with technology. For about a century, but especially in recent decades, this symbiosis has been increasingly turning into a fusion, at least in the West . We are as inseparable from technology as the crab from its shell. In America, we cannot exist without a car, except in the cities, and we cannot even give natural birth in 30% of the pregnancies. Medicine develops into maintenance and repair engineering.

In most of the world we procreate less and less, given the choice between children and less demanding and ostensibly subservient products of technology. Things multiply incomparably faster than humans. They use a digital code, which is a counterpart of organic DNA, and do it in more efficient ways than we who are unable to function without daily food, water, and night sleep.

The Things obliquely vote in elections, without going to the polls, and citizens can forgive the government anything but the collapse of production of Things that sustains

humans. This is what we consider the twentieth century civilization and the postmodernity is in no way different.

Initially an extension of animal limbs, technology has been moving closer toward the classical biological kingdom. **Domain** could be a good term for the four levels above kingdom—life, society, Technos, and ideas—for which the reproducible and convertible into digital form codes exist.

The species of Technos—from a toothbrush to the giant *EMS Queen Mary 2*—have acquired a digital code, similar to RNA and DNA of biological forms. Not only the clones can be **expressed** (brought to existence) from the coded message at appropriate conditions, but also mutants and recombinants. Moreover, many aspects of human behavior can be codified in a digital form, as in the infamous *US Tax Code,* the Queen Mary 2 of American bureaucracy.

The natural hereditary codification of behavior is an ancient biological feature, which in humans took a new form as the laws of Hammurabi, Bible, Talmud, Confucius, and Koran. Separated from human bodies and put on stone tablets and paper, some of the codes engaged in an independent and vigorous evolution, while others have been dragging their feet.

The digitized technology, previously completely controlled by human minds, moves toward more independence and even competition with humans. We depend much less on the weather than on the stock market indexes. Our life runs under the despotic ticking of the clock and the menace of the neo-Hammurabi codex of schedules and contracts with severe punishment for a breach.

The literary production becomes standardized, industrialized, and combinatorial. I find the list of titles by Nora Roberts, author of over 160 novels in 25 years (100 in the first 15 years), very illustrative of this process: "*Naked in Death, Glory in Death, Immortal in Death*, etc., total of eighteen species of *In Death* family. Then go the species *Born In* (*Fire, Ice, and Shame*), *Key of* (*Light, Knowledge, and Valor*), *Red Lily, Black Rose, Blue Dahlia,* etc. The titles look like mathematical function: $y=f(x)$, where f is: Death, Born, Key … etc, part of a code for 3D-printer. It may seem that, unlike Isaac Asimov, the author of 500 books, who used scientific sources for many, Nora Roberts taps only her imagination, but some of her books are well equipped with technical stuff, for example, gardening in *Blue Dahlia*, my first and last encounter with the author who inspired me to write this Essay.

We evolve by gain and loss. It is good to be in equilibrium with your time. It is bad to live in times of stress and turmoil, although, as Rhett Butler says in *Gone with the Wind*, "I told you once before that there were two times for making big money, one in the upbuilding of a country and the other in its destruction."

This is by no means good or bad, but just how it is. We evolve by gain and loss. It is good to be in equilibrium with your time. It is bad to live in times of stress and turmoil, although, as Rhett Butler says in *Gone with the Wind*, "I told you once before that there

were two times for making big money, one in the upbuilding of a country and the other in its destruction."

SUMMARY OF POINT 1: TECHNO-HUMAN SYMBIOSIS

1A. Humans and their technology are parts of a larger evolving complex system (ECS, or X-system) over which humans can exert only a limited control. Moreover, they may not want any strong control at all. This idea was first expressed by Heisenberg: **Werner Heisenberg,** *Technology: Intereffect of Technology and Science*. In: *The Physicist's Conception of Nature.* New York: Harcourt, Brace & Co., 1958., p 16. Also published in 1970 by Greenwood (Westport, CT).

1B. As result of **acquisition of digital code** in postmodernity, technology, i.e., non-human component of human condition, is gradually diverging from the human component. Things do not work for us anymore. We work for Things. We acquire the habits of Things and their highly ordered ways of life, following ultra-orthodox religions. They acquire our reasoning, but not yet our creativity and anarchy.

See The Visible Hands. Homo Faber and the Chemistry of History

2. Numerization

The radical increase of productivity of information processing is exclusively postmodern.

The following is taken from : http://bestsellers.about.com/od/authorprofilesaz/p/roberts_profile.htm

Trivia from Nora Roberts' Official Web site:

- There are enough Nora Roberts books in print to fill the seats of Giants Stadium nearly 4,000 times. If you place all Roberts' books top to bottom, they would stretch across the United States from Los Angeles to New York City nearly 11 times.

The increasing productivity and output have been the obsession of Western capitalism since the times of Karl Marx. The main goal of Soviet Communism was also production. Asia has joined the club of Mad Hatters in postmodernity.

There is a jump of production and productivity everywhere: in education, medicine, science, law, industry, trade, transportation, politics, and arts. Computers play the role of powerful catalysts in this process because they speed up codification, mutation, search, recombination, packaging, and transfer of information, and they do it by **instantaneous manipulation of big blocks**. This kind of work, for which the humans are notoriously

unqualified, requires practically negligible supply of energy for each act, but already a significant amount overall, interestingly, for cooling the computers, too.

This intensification of dematerialized procreation creates flows of information so enormous that they cannot be processed by humans. Congressional documents that cannot be actually read word by word because of their size are a good example. If the US Constitution were written today anew, it would be, probably, the size of Britannica.

Midgets and monsters materialize from the secret dreams of computers in such overwhelming numbers that they cannot be consumed, even if they are bought.

The corridors of academia swarm with bright and ambitious people most of whom cannot even count on taking the prestigious tenured offices with good view from the window. Yet they do dream, and the corridors are full of tension.

The growth of productivity alone and the phenomenon of overproduction are by no means new. The new aspect is the radical acceleration of information processing.

The postmodernity is a natural result of enormous jump in information productivity, which distinguishes the second stage of Industrial Revolution. The productivity explosion multiplies everything: educated and articulate leaders, art, movies, books, scientific discoveries, technical inventions, things for sale, culinary experience, ignorance, and spectacular disasters and crimes. This productivity leads to huge loss of human effort, see **Essay 34. On Loss**. The tree of civilization looks like a mature oak dropping thousands of acorns every year, of which maybe dozens germinate, but only a few grow into tree. Moreover, if the oak grows in a park or your backyard, the chance of new growth is nil. At the same time, in some backyards of civilization, death and misery reign and people chew the bark and chaff.

As result, humans, things, and ideas—each of them only a part of this system—fiercely compete for an advancement to the top. The advance in postmodern times has a clear, unambiguous, continuous, and universal numerical measure: money. This is something neither modernity nor pre-modernity knew. Socrates, Shakespeare, Kant, Mozart, and scores of the greatest creative personalities of the past would fail under the postmodern yardstick of success. They were revered in the liberal pre-postmodern society outside the eternal cult of money.

The tyranny of number is today universal. Thus, Isaac Asimov consciously pursued the magic number 500. The publishing output in academia is the numerical measure of scientific level. For comparison, the ethics of Confucius (see **Essay 43. On Numbers**) would not provide a numerical measure for virtue and vice. It would teach you, however, how to compare two deeds.

I believe that the trend toward numerical measures is one of the most significant postmodern developments. Since everything grows, it should be counted. On the surface it just simplifies and speeds up the process of selection of individuals or response to an input. If we take a complex mechanism like an airliner or a complex system in an approximate equilibrium (economy, army, government, or company over a short term) it

is able to function only because its components communicate with each other and environment in the language of numbers, sometimes only one and zero. We still encounter measures like large, extra-large and jumbo, but not surprisingly they can be disappointing. The numerization, which opens an easy way to digitalization, is a sign of a society freezing into a hybrid of an organism and a mechanism.

The preferred range of numerical properties assigns to an individual a social or professional status with the same ruthless tyranny as the feudal class system. Democracy is founded on numbers. too. One of a few areas where we are blind to numbers is casting a vote for a presidential candidate or a pop idol. But then our numbers create presidents and idols. A rich, non-elected and powerful person is what links us to the entire previous human history.

> There is a curious social result of the numerization. Since the scale of wealth is continuous, it creates an impression that the democratic capitalist society is classless. Anybody can move up or down, one dollar at a time. Nevertheless, by adding a digit to the summary income we make a significant step in quality of life, but not yet in power. After a certain threshold, we make a step toward power. At the next level, we acquire real global power, as George Soros once did.
>
> On the logarithmic scale, taking $10 000 as the lowest income and $100,000,000,000 (one hundred billion) as the highest, we can calculate the number of social classes in America as exactly seven. There were three classes ("estates") in France before the Revolution. There were four or five classes in the czarist Russia and three (or two: commoners and *nomenklatura*) in the Communist one. Probably, after 1,000,000 we should take two digits as the class boundary. Dozens of billions means real power and Bill Gates and George Soros have already left the idealistic but not yet completed cases of its use. One conclusion we can already draw is that in order to apply financial power for a useful result, you need a certain social technology, a kind of a machine, usually absent in the objects of application. When you apply money for a domestic change, as George Soros tried against President Bush, you get a battle of machines, see **Essay 43. The Cold Civil War in America** and the size decides. The true picture is more complex than that, but still nobody has compounded a price list for revolutions, reforms, and coups d'état. The reason lies in the idealism, chaos, and anarchy of individual human mind, the very essence of humanity.
>
> What the Nobel Peace Prize of 2006 winners Muhammad Yunus and Grameen Bank did, apparently, with a success, was to provide a poor individual with a little social machine working for this individual alone, free from the heavy hand of the government.
>
> Interestingly, the Republican revolutionaries have widely used the same **pattern of local action** by working with individuals, detecting sympathizers, and nudging them to vote by knocking on their doors. This is pure technology.

The domination of the **quantitative** measures for human **qualities** in postmodern life oddly contradicts the postmodern skepticism and **mistrust of truth**—another pomo foible

meaning that everything is just a matter of interpretation. One cannot argue with the result of measuring with a wooden yardstick.

What would you do to make a move along the scale of success in the only possible direction: up? You would fight, yell, grimace, elbow your way, run naked, wear peacock feathers, lie, steal, destroy, exploit, and advertise yourself. If you do not do anything, others would. By the end of the day, you could have a clear, unambiguous measure of your success or failure: a number.

This great linear asymmetry of postmodern times is symbolized by the brushmobile from The Rusty Bolts of Complexity: Ideograms for Evolving Complex Systems on this site. Although chaotically shaken, the brushmobile moves in one direction only.

SUMMARY OF POINT 2: NUMERIZATION

2A. Postmodernity means the life under the tyranny of the naked number: money, a universal measure of all things. What has no monetary value is outside the system and the sensors of society are anesthetized to it.

2B. The clear continuous numerical measure is standard for physical and chemical systems. Competition is typical for biological systems. Our civilization becomes more and more embedded in mechanical and statistical systems that we, with our mind, spirit, and inimitable humanity, have been so proud to stay apart from for centuries. Our chaotic impulses are a source of shakeup and mutation in these systems, and our hands and rational minds are just enzymes for assembly lines.

2C. Numerical measures for human condition, combined with the universal digital code, create a typically postmodern system which is less and less is regulated by human reason, will, and whim and more and more by the overall trend toward stability.

3 Meso, or Artification, Commodization, and Interposition

There is a particular ancient economic mechanism that has come to prominence during the postmodernity, as result of growing productivity and increasing flows of money and information. I call it mesoderm effect or **meso**, for short. On mesoderm, see **Essay 43. The Cold Civil War in America**. The oldest example is the merchant, a middleman between a buyer and a seller. Meso, or **interposition**, for a more academic

sound, means that a third party (organ, tissue, organization, agent, gate keeper, interpreter, check point sentry, broker, etc.) emerges and grows between any two communicating parties.

Examples: literary agent, credit bureau, employment agency, political consultant, financial consultant, advertising firm, inventor's assistance, lawyer, salesman, activist cleric, mutual fund, TV news networks. Nothing in this list is specifically postmodern. But we can add to the same list a cable TV box, power drill, power steering, gas mask, rubber gloves, computer, TV itself, medical imaging devices, packaging, remote control, all kinds of automatic devices, and all the other products of technology that interpose themselves between two people, two machines, two things, a machine and a human, a thing and a human, and all the other binary combinations. In short, all that is technology. Even Isaac Asimov, practically forgotten as a popularizer of science, was a meso between science and the man from the street.

Mesoderm effect, or interposition, is a cessation of a direct contact between individuals, things, institutions, and other components of a system and the growth of an intermediate component that provides communication and interaction. Interposition (also known as specialization) is the general trend of biological and social evolution.

The formation of a specialized organ or trade is usually regarded as gain for both initial parties. There is no reason to lament about the voluntary and desirable loss of human independence. New generations always adapt to a change and do not see it in terms of gain or loss.

The growth of productivity is all-encompassing. Everything multiplies and diverges in developed societies except the humans themselves.

> The import of humans by Western Europe and America could be the most consequential historical event, with the bloody American Civil War and the quiet collapse of the Soviet Union as historical precedents.

Concentration of wealth in private and corporate hands creates powerful flows of money, which economists compare with **ATP** (adenosine triphosphate, the universal currency of energy in living organisms, see **APPENDIX 2**). The money is created in cycles of investment, production, and trade. The cycles are ultimately run by food, oil, and coal. The faster the turnover of money, the larger the figure on the bottom line, the more goes to the next cycle. This cycle, typical for the phenomenon of life, more and more defines the human condition, the forms of politics, entertainment, education, art, and family life.

The meso diverts a part of the flow in exchange for speeding up the flow.

Both the merchant and the remote control perform the same abstract function of **catalysis**. They speed up the movement from our desire to its fulfillment, or, more generally, from instability to stability.

This is all trivial. Is there anything new after antiquity and Karl Marx, then? The numerization is, see Point 2. The judgments tend to be done on the basis of hard formalized data and not immediate perception. There is certainly a gain side to it. If we voted for a presidential candidate basing on a kind of political credit report, it would only benefit democracy. But most voters trust the **image** of the candidate—or an issue—which is prepared by a meso, similarly to a preparation of the body by the undertaker.

In other words, the postmodern novelty is the shift from the knowledge and functionality to art: an **artification** (the term makes only a few appearances on the Web) of the systemic function.

Artification of a function as the function of the meso in general is a big subject, with still unsettled terminology. I give here only a few examples of the postmodern meso effect apart from political campaigning. .

1. The "modern" (i.e., pre-postmodern) advertisement used to be a demo and an explanation of properties and advantages, not necessarily real, of a product. The traveling salesman demonstrated his vacuum cleaner in action. The postmodern advertisement is a piece of art, often of admirable quality, which may not have any relation whatsoever to the product but attracts attention to it in purely artistic way. This is the art made by humans for the consumption of things.

2. The postmodern art—postmodernity for art started earlier than for the rest of the culture—is an object of art that is inseparable of the presenter and interpreter of the art. Without the art meso, a man from the street may not recognize it as art at all. There are extreme examples, but Andy Warhol is most typical. Art is a fine seismograph that registers the heavy steps of distant dinosaurs.

> **NOTE**: Art, one of the most fascinating topics for me, has been one of the main focal points of pomo (see Michel Foucault and, especially, Jean Baudrillard), with the discourse on art turning into a pomo art itself. I try to stay away from this subject and present only my own observations. Nevertheless I am obliged to mention some parallels visible through the fog of the pomo obfuscation of which I am in no way critical. One cannot be critical of art, but only of performance.

3. The previous examples were rather trivial, but I have recently noticed something more subtle.

I am deeply impressed by everything the historian Niall Ferguson has written and expect more from him. All of his books (I have passed over only the one about the Rotchilds, but I will get to it, too) are highly readable, eloquent, provocative, and stimulating, with the just right dash of irony. One of his latest books, *The Colossus* (Niall Ferguson, *Colossus: The Price Of America's Empire*, Penguin Press, 2004**)** , by the way, well quantitatively illustrated, reads like good fiction and is hard to drop.

The double entendre around *fiction* was not initially intended, but on some deliberation I begin to think that if it reads like fiction, it probably is, at least in a sense. The author's signature device is not so much counterfactuality as allofactuality (or isofactuality?): let us **imagine** that **A** is not **B** but **C**. We will probably learn something about **A**, **B**, and **C**, which we would not be able to see from the hard facts alone. This is a method that I can greatly appreciate as a chemist. Chemistry is based on choosing between alternatives and requires a lot of imagination even with a computer on hand.

I am in no way critical about Niall Ferguson, a writer of undeniable brilliance. For some reason, another prolific writer, stern, humorless, and pain to read, comes to mind: Noam Chomsky. Chomsky's method is somewhat different, but allofactual pattern is the same. Let us take the **definition**: **A** is **B**. Then **C** is **B**. Thus, Chomsky in his *Middle East Illusions* (Roman & Littlefield, 2003) takes a definition of terrorism from some old military manual, declares is good enough, and then shows that USA is a terrorist state (p.236). Of course, in the process we may re-learn a lot of well-known facts about the USA. But there are scores of other definitions of terrorism and no consensus in sight.

> Both Ferguson and Chomsky, by the way, legitimize references to the Web, the source of unbridled and unchecked imagination, as well as hard facts and disciplined analysis.

So, let us imagine that America is an empire. It is impossible to know whether it is or not because it depends on how we define empire. But if we admit that, we can compare it with other empires. In the process we learn a lot about America, as well as about the modern world. Otherwise we would spend a lot of time and effort from the cornucopia of facts and parallels that the historian selects and orders for us, maybe sometimes tongue-in-cheek.

Is it possible to know anything for sure? Yes, of course. Oxygen is a chemical element and water is a chemical compound. This follows from the definition of what those terms mean—consensual definitions that agree with the facts. Definition is not a truth: it is a convention.

Niall Ferguson, in essence, does the same as Noam Chomsky. He takes an exemplary empire of the past—British—and compares it with the present American "empire," although the two are separated by a period of radical global change, not to mention a lot of other features. The British Empire was a colonial overseas empire. The Soviet Empire was a walk-over empire. So was the Chinese Empire. The American "Empire" does not have a single political satellite, as far as I remember.

And yet the method of Ferguson is justified in my chemical eyes, while the method of Chomsky is not. The reason is that Ferguson takes a fact and compares it with another fact, while Chomsky takes an arbitrary definition and applies it to a fact.

Ferguson, a half-serious advocate of globally proactive America, and Chomsky, a dead serious advocate of globally inactive one, seem to be two opposites. I mention Niall Ferguson and Noam Chomsky because some of their books illustrate in my eyes the fine

note in the bouquet of postmodernity. A historian, chemist, businessman, politician, scientist, artist, musician, and actor do not just do their professional job according to modern tradition but they do something else: they **advertise** themselves in the deafening pandemonium of postmodern world. They **perform**. To performance, unlike science, the notion of truth does not apply.

> Noam Chomsky is perfect in picking up and cataloging internal contradictions (i.e., lies) in American policy. That politics, starting from the election campaign, is art of legal deceit and fraud, is both a definition of politics and a political statement.

Postmodern reality and "truth" are so complex that a man from the street cannot distinguish performance from the truth. Brian Greene, a theoretical physicist (and actor), is an author of popular books and a TV show on some problems of modern physics, such as string theory. The performance is brilliant, but you cannot understand what string theory is, unless you are an elite physicist. I take it as an illustration of the cardinal feature of postmodernity: there are things so complex and confusing that they cannot be understood by outsiders. There are no Isaac Asimovs for them. But they can be performed.

The third distinguished author of postmodernity—George Soros—is very **modern** in my eyes because of his noble insistence on the doubt (fallibility), which created modernity itself, together with science and even business. His world view, however, is not so simple and deserves a separate take. He is also modern in the sense that he dares to say inconvenient truth and do dubious functional things.

> **NOTE** (November 2006). Having finished *The War of the World* by Niall Ferguson, I must say that the book is an example of brilliant artistic performance and another evidence of the great creative talent of the author. I simply admire it. There is absolutely nothing belittling in the word performance. As any great performance, it has left a deep impression on me. Ferguson has written the score, directed an orchestra and the choir of dead voices, and resurrected the sound of the epoch most of which coincided with my own life.

SUMMARY OF POINT 3: MESO

3A. Postmodernity includes the substitution of artistic performance for function and knowledge.

3B. Postmodernity makes the interposition of a middleman, who manages the relation between the truth and its appearance, a universal phenomenon of culture.

3C. A postmodern creative personality takes up the function of his or her salesman or hires one. See **APPENDIX 3.**

Is a postmortem for modernity premature?

History is a continuous process. Historians divide evolution into episodes, chapters, periods, and eras, quite like paleontologists, but with the advantage of tracking the relatively recent episodes in real time. As far as the episodes are concerned, they have a beginning and end. They are, so to speak, terminal entries of historical hierarchy, the physical matter of history. Events are factual, sensory, tangible, and recordable. The WW2 had a beginning and an end, which could be disputed only within narrow margins. The war was documented day by day. The pre-war and post-war periods, however, have only one clear-cut edge each because the **connections** between the war and other events outside the war range are **abstractions**. Moreover, WW2 itself as a whole is a generalization.

This detailed vision of history goes back, probably, for two centuries. When time is counted by millennia, only rare flickering lights are seen in the dark. Remarkably, the current story of humanity, in spite of the flood of information, seems murky and confusing. History obviously needs a sufficient distance between the observer and the events. Impatient, we bite on the sour apples of history because our spiritual parents taught us that history was good for our health. The fruits of history need to mature to appropriate bitterness.

The borders between pre-modernity, modernity, and post-modernity are much more diffused and debated than those of WW2 because the two last periods, as any large historical period, are highly abstract. The richness of detail gives a lot of fodder for arguments. For comparison, a rule of a king or a presidency is as clear-cut as any universally recognized fact. Of course, the *pomo* in the Petri dishes of academia, where the cultures of thought grow, can mutate in all directions and dispute anything. Postmodernity, however, is in the air, and we can measure it like the concentration of the carbon dioxide, its companion.

I believe that the extremely diffuse, controversial, and disputed distinction between modernity and postmodernity emerges from the changing human condition, which includes the changing world view. It is hardly possible to separate the result of observation from the scale of measurement. We also have here an analogy (noted by George Soros) with the uncertainty of measurement in quantum physics: our observation changes the object.

Thus, the entry on Postmodernity in Wikipedia lists the following features of the period:

> These features include globalization, consumerism, the fragmentation of authority, and the commodization of knowledge

We can see that all those features are really pertinent to our time, but by no means are they unique to it. Medieval universities sold knowledge, too, while globalization and consumerism are simply new terms for eternal human urges. History is a record of expanding contacts between nations and people, and as soon as there is something to consume, people start gorging on it. The discovery and rise of America was a spectacular



event in **globalization**. So was the Silk Road through Asia. Democracy is just one of synonyms of **fragmentation of authority**. The royal courts of France left some benchmarks of opulent **consumerism**, which we are trying to surpass by Golden Opulence Sundae, the epitome of numerization.

High class is 1 followed by a pageant of zeros: $0_{000}0_{00000}0$.

<<< Golden Opulence Sundae, $1000.

To take a well-defined example, Industrial Revolution was a process going back to discovery of fire. Looking back, a historian can see a borderline between crafts and mass production, use of wood and use of oil, making small steel things commensurable with human size (sword) and large ones (bridge, steamship). After the mid-19th century, the pace of history accelerates, maybe simply because we record and remember the recent events better. The assembly line was a bridge into postmodernity and remains a fundamental ideogram for both biology and technology, as well as for mass culture.

In order to achieve at least a semblance of a base for consensus, we need to develop numerical nonmonetary **measures** for the features we discuss. For example, we can measure the process of consumerization by the fraction of an hour a TV network allocates to commercials. We can measure the dynamics of optimism/pessimism by the number of "*The End of...*" books per decade.

A search on Google for ["the end of" book amazon] gave me about **152,000,000** for **"the end of" book amazon** , including the end of books, history, art, democracy, irony, globalization, oil, and, of course, the world itself.
The number itself has no relation to the actual number of book titles. It tells me about the enormous redundancy of our postmodern civilization, which is one of its few fundamental features. I suggest a term for it: fecundity + futility = **fecundility.** **[2009:** Results **1** - **20** of about **1,650,000,000** for **"the end of" book amazon]**

The fecundity of the oil drenched, ambition tilled, and greed fertilized postmodern soil produces a field of grass in which only a few give seeds and the rest wither by the nightfall, barren. Suppose you are standing at the edge of the field and need to find those few. Or suppose you are the intelligent shot of grass and want to leave progeny in this field. Of course, you roll up your sleeves or hire a handyman.

We can really study history as a natural process by using quantitative measures (the idea of Pitirim Sorokin, see **Essay 27. The Existential Sisyphus**) and although I am surprised that, as far as I know, nobody has systematically explored the modernity-to-postmodernity transition with **modern** methods, I have a provisional explanation that postmodernism in humanities by its very essence does not look for the so-called old-fashioned truth.

As a historical fatalist, I regard it senseless to grumble about new times and celebrate the past. Our loss could be not somebody's, but our own gain. All the more, the past never goes too far away. History, contrary to James Joyce, is not "...a nightmare from which I am trying to awake," but the only firm ground among the swamp of time.

Postmodern times, like the Middle Ages, are the times of dark oracles, eloquent prophets, snake oil peddlers, bards, and traveling acrobats. Remembering history, however, we need not to despair if our times look like the Middle Ages. History today is as fast as the electronic payment, not as a horseback messenger .

So, is a postmortem for modernity premature? It is premature to tell.

APPENDIX 1 . Facts and abstraction

The distinction between terminal inputs and next combinatorial levels is fundamental in various areas of knowledge from neurophysiology to computer science, mathematics (terms and expressions of a mathematical system), and philosophy.

The abstract divisions of historical periods, if they are not based on events, emerge when a researcher looking at two adjacent episodes notices that something has changed and, tracing the chain of events back and forward, concludes that this *something* becomes even more pronounced along the timeline and much less pronounced backwards from the breaking point. This something is an abstraction and is open to interpretation. Large blocks of historical framework—capitalism, socialism, democracy, tyranny, terrorism—seem elementary, but everybody understands them differently. There are many smaller blocks, like increase, expansion, production, conquest, defeat, collapse, conflict, alliance, dependence, debt, etc., which constitute less disputable and more consensual items of historical equipment. I would call them—and not events—the atoms of history. They are atomic stages of the evolutionary mechanism.

My view of the world is chemical. It means that I see the world as a set of elementary atomic units (points) connected in a particular order. The act of change is a transition to a different or the same set connected in a different order. There are only four "elementary particles" of structural change: formation of a bond between two atoms, breakup of a bond, appearance of a new atom, and disappearance of an atom.

APPENDIX 2. ATP, adenosine triphosphate

Quotations:

> ATP is a carrier of chemical energy in the form of high energy phosphate bonds. (The anhydride links between the phosphate groups in the figure above.) NAD^+ is a carrier of hydrogen and electrons and is involved in many oxidation-reduction reactions in the cell. It can pick up and transport $2e^-$ and $2H^+$ when loaded. You can think of NAD^+ and ATP as little trucks that transport energy around the cell.
>
> Another common metaphor for them is **money**. NAD^+ and ATP are the energy currency for the cell. Money is a medium of exchange. People assign work for us to do, we receive money for doing it, and we convert that money into things we want or need. The cell takes its energy source, converts it into NADH and ATP, and then uses them to perform needed tasks in the cell.
> Source:http://dwb.unl.edu/Teacher/NSF/C11/C11Links/www.bact.wisc.edu/microtextbook/metabolism/BasicEnerConcepts.html
>
> Nearly all bodily processes do not run on the fuels mentioned earlier. They run on the conversion of ATP to ADP, which makes ATP the energy currency of choice. You can see the fuels mentioned as things you could barter with and **ATP as actual money**. Source: http://ds9a.nl/metabolism/conversion.html

So, quick quiz: What is one thing that all living things have in common? ATP? Right!

> That, says Professor Yount, is because ATP is the universal energy "currency." If sugar is your savings account, **ATP is the cash** you get when you withdraw money from the account.
>
> Life requires a lot of that currency. Every one of your cells contains a billion molecules of ATP! Source : http://www.wsu.edu/DrUniverse/food3.html

APPENDIX 3. Life in a pandemonium

The paradox of postmodernity is that individualism—the greatest invention of Renaissance and Enlightenment—turns into the entrepreneurship. The individual acquires split personality and has to manage his or her individualism by creating a private company of one with secretary, shipping, receiving, public relations, finance planning, library assistants, image advisor, and makeup artist. The equipment consists of a powerful computer with lots of peripherals, which is able to extract, process, combine, remix, and print out information, so that book, article, or proposal writing becomes a kind of automated collage pasting. A successful postmodern individual is an enterprise, a piece of art, and an ingenious device, a sun surrounded by planets, comets,

asteroids, and just trash. With a little of surplus of success, the person turns into a real corporation with human staff, which sells the image. Oprah Winfrey, Howard Stern, Martha Stuart, and the rising star of lively Rachael Ray are typical examples. The individual cannot succeed without developing a web of contacts.

Niall Ferguson, Noam Chomsky, and George Soros are already postmodern intellectual institutions. So are Charlie Rose and Bill Moyers, whose function is quite different: they are mediators. They guard the gate besieged by an enormous crowd of individualities and they establish some kind of ranking for them in the same pattern sense as Oprah Winfrey ranks human misfortune and Martha Stuart ranks cake recipes. They are the operatic voices in the pandemonium of growth.

2006

Essay 47. The War

1 Artist on War

Vasily (Vasilii, Vasilij, Vasiliy) Vasilievich Vereshchagin (Верещагин, Василий Васильевич,1842-1904) was a Russian artist and humanist. He left a pictorial record of his travels, including Balkans, Middle East, India, Japan, Philippines, Cuba, and USA. Behind this short bio clip lies a rich creative life and unusual destiny. Vereshchagin, an anti-war *batalist* (painter of war), described also as *Artist at War* in the book in English of the same title (http://www.upf.com/book.asp?id=BAROOS93), remains a personality of global rank, well remembered but still relatively little called under the light of modernity—and postmodernity—outside Russia. He was by no means anchored to his Russian background. His *Apotheosis of War* (**Figure 1**) was painted in Munich, among other works in the *Barbarians* series. It was inspired by the painter's impressions during the Russian-Turkestan war (1868) on the territory of today's Uzbekistan, a former Soviet Republic. It was intended as a symbol and supplied with an inscription: "Dedicated to all great conquerors: present, past, and future ones."



Figure 1. Vasily Vereshchagin (1842-1904), *Apotheosis of War*, 1871.

Tamerlane (Timur Lang), one of the greatest and bloodiest conquerors, died in 1405 and was buried in his capital city of Samarqand (or Samarkand) in Uzbekistan. His grandson Ulug Beg (Ulugbek), famous of his patronage of arts and sciences, especially, astronomy, and not of murder, was buried aside Tamerlane. For the fans of historical symbolism that may mean something about the precedents for progress in the Middle East, to which Uzbekistan—the neighbor of Afghanistan—belongs. All you need is the oriental patience, for which the American Constitution, with presidential elections every four years, did not make any provision. Quite to the contrary: the midterm elections give the citizens a limited opportunity to vent their impatience every two years.

Although Vereshchagin had seen some small piles of sculls during his travels along the Russia-China border, the following photo from Cambodia (**Figure 2**) testifies that *Apotheosis* was not painted from nature: in his painting the lower jaws look still attached to the sculls. The ongoing global murder makes us all experts in such things. Vereshchagin's prophetic imagination was surpassed by the reality of the killing fields of the twentieth century.



Figure 2. Victims of Pol Pot's Khmer Rouge rule in Cambodia. The skulls and bones of thousands of unidentified victims are displayed at the "Museum of Genocide." Photo and caption from: http://www.frontline.org.za/articles/blackbook_communism.htm



Figure 3. Golden Opulence Sundae, $1000

I have already used the photo of the Golden Opulence Sundae, $1000, in **Essay 46**. I confess that the sundae with its "edible gold" struck me more than the photo of human bones, for which I had already been prepared by the catacombs of Paris and the living skeletons of the Holocaust. The Golden Opulence symbolizes the remarkable stability of America amidst turmoil. It celebrates wealth, the best ballast for hot air balloons in stormy weather. It does it with a cavalier attitude toward gold: the omnipotent tyrant is forced to crawl through human bowels to the infamous end. This is why I counterbalance

the gray morbidity of **Figure 2** with **Figure 3**. The picture of hell is unconvincing without paradise as an alternative. And *vice versa*.

Regarding Tamerlane, here is his place in an excerpt from the roster of wars:

> —And David and his men went up, and invaded the Gesh'urites, and the Gezrites, and the Amal'ekites: for those *nations were* of old the inhabitants of the land, as thou goest to Shur, even unto the land of Egypt.
> And David smote the land, and left neither man nor woman alive, and took away the sheep, and the oxen, and the asses, and the camels, and the apparel, and returned, and came to Achish. *Samuel*, 27:8,9
>
> —Ordered by Mangu to subdue the Mongols' western neighbors, Hulagu led his enormous army into Persia in 1251 and by 1256 had crushed the heretic Ismaili order of Muslims (also known as the Assassins). In 1257 he besieged and sacked Baghdād after the Abbasid Caliph al-Mustasim rejected Hulagu's demand for Abbasid surrender. In the massacre, only Christian lives were spared, apparently due to the intervention of Hulagu's Christian wife. Baghdād burned for seven days, and some historians estimate as many as 800,000 people, including the caliph and his family, were killed. In a letter to King Louis IX of France, Hulagu estimated his army killed 200,000 people.
>
> —On Tamerlane's distant expeditions, where his purpose was only to loot and strike terror, he ordered atrocities that are still remembered. At Esfahān (Isfahan), in Iran, which had rebelled after surrendering in 1387, he massacred 70,000 people and constructed towers of their skulls. In 1398 at Delhi, in India, he had 100,000 Hindu inhabitants slaughtered and razed the city.
>
> —The human cost, not including more than 5 million Jews killed in the Holocaust who were indirect victims of the war, is estimated to have been 55 million dead—25 million of those military and 30 million civilian.
>
> —On the night of February 13, 1945, hundreds of Allied bombers released a firestorm of bombs on Dresden, killing 135,000 people and demolishing 80 percent of the city.
>
> —In a contrast between Czarist Russia and the Soviet Union, the Black Book [of Communism] notes that while an average of 68 people were executed a year under the Czar, up to 690 000 executions a year could be carried out under the Commissars (such as in The Great Purge!) In 1918, Lenin personally authorized the execution of 15 000 people in just 2 months. In just 7 years 7 million people were condemned to the concentration camps, in the gulag. Source: Peter Hammond, http://www.frontline.org.za/articles/blackbook_communism.htm

> The above quotations, except the first and the last, are from: Microsoft® Encarta® Encyclopedia 2000. © 1993-1999 Microsoft Corporation. All rights reserved.

What the above incomplete roster tells us is the confusing nature of war: a war can be waged against a side that, as the Jews, Cambodians, and the victims of Stalin's terror, does not offer any resistance. Moreover, the absolute majority of the Geshurites, Gezrites, Amalekites, inhabitants of Baghdad, Esfahan, Delhi, and Dresden did not resist either. Moreover, a war, as war on cancer, smoking, drugs, poverty, terrorism, global warming, Democrats, and middle class, can be waged without firearms against an abstract or invisible enemy. Furthermore, a war can be waged only in somebody's imagination or even against yourself.

At least since the times of Socrates, to serve in the army and navy has always been a noble occupation, which, I believe, it should be. It is the intentional mass murder of unarmed people and not the war itself that stands alone in the history.

A confusion descends on me like the morning fog from the Pacific when I watch how the awful human toll has been accumulating over the years in the Iraq war. Mass murder can be committed incrementally, triggered unintentionally, displayed openly, and executed without a slightest personal responsibility: no Tamerlane could be found.

The following is my own personal impressions of an impatient, but mostly passive, witness of five wars: WWII, the war of the Russian Communist government on its own people (ended in 1987), the war of the militant Islam on the West, the Cold Civil War in America, and the Iraq war. As for the wars with myself—I have lost count of them.

Watching TV on September 11, 2001, I had an overwhelming feeling of defeat: my new country was built with windows and doors wide open and left unguarded against the hostile world from which I came.

The Iraq war has been another defeat: the self-proclaimed "only superpower," the world hatchery of technical miracles, the richest country in the world, the nursery and attraction of the most brilliant minds, the source of a unique system of democratic ideas, and the shelter for refugees like myself, is shamefully failing in a limited war with invisible but certainly human enemy, armed only with simple weapons, fanaticism, and the honed through ages cruelty.

I mourn the dead on both sides, but I also mourn **our defeat**.

One of the causes of the defeat is another war—or, worse, a chronic disease—that eats up America from the inside: the Cold Civil War. A war ends up with peace. A chronic disease may end up in death. The Democratic tsunami of 2006 dispelled the heavy stale air, but I still cannot regain my equilibrium. I see a slim chance of truce, a ceasefire, but not the end to the CCW. America confronts only one unfriendly world superpower: herself. America and I are of the same blood.

I foresee scores of books written about the Iraq war, probably, even more than about the Vietnam War. I am not qualified for any professional judgment about war. All I can say is that I am not a pacifist and I do not believe in the end of history. I also believe that there could be sound reasons to invade Iraq. The tragedy was not the invasion itself but the utmost inability of America to win the war, understand the situation, learn the lessons, adjust to reality, stop the slaughter, to prove the "number one" rank of the only superpower, and even to think more than one election ahead.

I am not familiar with military theory. I am not a fan of military literature. I can hardly say anything original, but the topic of war is something I have to get off my heart.

Next I will share some thoughts after reading *The War of the World* by Niall Ferguson. Further I will approach the abstract concept of war as a chemist, using the metaphor (ideogram) of surface tension. Finally, I will convey some impressions of the Iraq war and conclude with a political recipe.

For a different take on war see *History as Points and Lines*.

2 Historian on War

I see *The War of the World* by Niall Ferguson (The Penguin Press, New York, 2006) as a brilliant performance. The main events of the twentieth century are widely known. It is the performance of the epic script that matters.

What is performance? Instead of definition I suggest comparing any two movies based on the same book, for example, **Munich** (Steven Spielberg, 2005) and **Sword of Gideon** (Michael Anderson, 1986), both based on *Vengeance: The True Story of an Israeli Counter-Terrorist Team* by George Jonas. The difference is in performance. In classical Japanese theater Kabuki and other traditional theaters of Asia the audience is attracted not by the content of the ancient plays, which everybody knows by heart, but by the way the actors perform the familiar roles. In modern theater, however, the faithfulness to the original is not required. Cesar might well kill Brutus.

A live witness of most of the bloody century, including WWII, and a reader of a big stack of books written by the WWI and WWII generations, I find the representation of the misery of the twentieth century by Niall Ferguson, born in 1962, amazingly correct. Of course I well remember the triumphal side of the era, too, but that was not the objective of the book. Even though I am not sure that the author proves his thesis (the exclusive violence of the century and three *e*—ethnic, economy, empire—as its cause, all of that unimportant, though), I refuse to criticize his book because whatever flaws one

might find, there are no standards for this kind of project. Thus, I completely approve of his minimalism regarding military operations and ignore slip-ups like attributing a Russian opera to a wrong composer.

At the first reading I dropped the book after a couple of chapters: it all was too familiar. But something was still pulling me to the heavy volume. When I had opened it for the second time, I got glued to the pages. A younger generation of readers without any relevant background may perceive the book differently, but I got captivated by the work of novelty and talent. Scores of small details, stimulating ideas, arrogant parallels (Roosevelt and Hitler, Holocaust and Hiroshima), and troubling questions hide in the wide folds of the generous and eloquent narrative.

I see the book as a study of organized mass violence—a difficult topic, especially because of the overabundance of material—but not as a theorizing or even descriptive study aimed at assembling and organizing facts. More like a study (étude) in visual arts, it works also as a novel, a painting, a symphony, and a play combined. I attribute its design and style not to its TV affiliation, but to the postmodern shift in arts and humanities, probably, most of all influenced by Michel Foucault. See **Essay 46. Postmodernity: Postmortem for Modernity.** Postmodernity looks not for the truth, but for entertainment.

In no particular order, this is what still reverberates in my mind after reading Niall Ferguson's book.

1. The use of the word **war** regarding unarmed people as victims leads to a misconception. In a fight between two soldiers both have a chance to win, as in sports, while an unarmed civilian, especially, woman or child, has no chance to stand against a gathering of hostile and murderous people. The fatal doom of organized non-military violence comes from the clash of an individual with a group, usually armed. The individual always wins in the westerns, but hardly ever in real life. The "war against the Jews" and the war against Imperial Japan are two very different species in the taxonomic family of organized violence. I believe that the war on terror and the war of Islamic terror against the West are two new separate and still very little explored kinds.

2. The victory of the Allied forces against the enemies who did not regard them as human was possible only because the Allies also saw the enemies as inhuman. Military victory against a **powerful** and determined enemy is impossible without extreme hate and dehumanization of the opponent. A strong, clever, cruel enemy can be defeated only by ruthless, brutal force—or by decades and centuries of patience. What follows is that the side that starts the war, the aggressor, loses a significant part of its strength because it inflames and legitimizes the reciprocal hate on part of the victim. Counteraction equals action.

This instinctive understanding of war as necessary dehumanization can explain the initial trust of most Americans in George W. Bush. He and his circle, as I believe, saw many things right, although not too far ahead. I expect some of the future historians say that one of the reasons the initial fast victory in Iraq turned into a defeat was that America was not

as brutal and wily as the customs of the invaded land required. One cannot conduct a war in a politically correct way. I see plenty of evidence that the administration had realized that and tried to outsource cruelty, but one cannot outsource hate. The idea of a native strong man in Iraq was quite expedient, but, unfortunately, not politically correct. Actually, there is a more weighty property than political correctness: "election correctness" or suitability for electoral campaign.

With a belated soberness Americans began to realize that the same things have different meanings in different cultures. Thus, corruption is natural in cultures of stark survival. Harsh and violent measures are seen as natural in authoritarian cultures, which explains the resurgence of Stalin's cult in Putin's Russia.

3. The ultimate outcome of the modern war, if it does not end soon, depends on the superiority of human and material resources, in spite of some lessons from ancient history. Planning the invasion of Russia, Hitler counted on the kinetic effect, i.e., the advantage of speed. The final outcome, however, was, as the chemists say, under the thermodynamic and not kinetic control: the grand finale of WWII was ensured by the Russian resources critically enhanced by American help. The Korean War was under a similar spell.

> Thermodynamic reaction control takes place with vigorous reaction conditions or when the reaction is **allowed to continue over a long time** to give a slow reaction time to reach equilibrium (Wikipedia).

The way chemists see chemical reactions, if translated into the language of war—and, by the way, of political action as well as of Hollywood action movies—predicts that if the attack is fast, the enemy can be completely overpowered in the short run and prevented from realizing its advantage **if the situation is quickly frozen**. If, however, the struggle drags on over a long time, the side with numerical, intellectual, and material advantage wins more often than it loses. The high art of war, therefore, manifests its effectiveness mainly in the beginning of a military operation. If the victory is not swift and decisive, the protracted conflict goes into attrition and the battle of resources instead of the battle of ingenuity. This is true of the war as a whole and of its episodes.

I found Ferguson's concise portrayal of the battle of Kursk (pp. 533 and 534), which was mostly attrition, heartbreaking in its eloquence. On page 111 one can find a great example of lost kinetic control resulted in Moltke's nervous breakdown.

The Iraq war is another example of the kinetics-thermodynamics play. The initial speed of invasion and the easy military victory had been lost and the balance of power began to shift due to the overwhelming numerical and suicide-technological advantage of the Islamic world. Quick, harsh, cruel, politically incorrect American actions would lock in the initial success, but the American commander-in-chief simply had neither guts nor brains to do that. War can be driven only by a clear goal of victory, not ideology. There was no clear American idea of victory, either. On the one hand, it was democracy, on the

other hand, it was domination, on the right foot, it was oil, on the left foot, it was another military base. And yes, the elections in the head.

> We may wonder how Turkey could become a working democracy, with all its shortcomings. The answer is simple: Kemal Ataturk acted as a decisive and cruel dictator establishing secular democracy. To compare, Vladimir Lenin was a decisive and cruel leader successfully turning a fragile democracy into a dictatorship. His clearly stated goal was never democracy but **dictatorship** of proletariat.

Do I call for hate and terror? If we are incapable of it, we should not start preemptive wars. Much better, we should never start wars at all. We can do better with defense, even if it means a defensive war.

4. Nothing is more cruel than a civil war. If a scale of qualitative comparison is possible, the recent civil war in Sierra Leone set an absolute record of cruelty, while the Iraq war excels in madness. But why is it so? My tentative explanation is that a side in a civil war is an **army that has no state behind its back**. Each of two armies may have headquarters, but no common government and no border. Since the civil war starts with the conflict of ideas, however primitive, one can never be certain that his neighbor shares the same idea. The fault lines of civil war run across families. Each side feels a fundamental uncertainty of statelessness and recurs to the most intimidating and barbaric acts of terror to make up for the absence of the security and supply that only a state can give. This is especially applies to rebels who, being at a numerical and material disadvantage and lacking tanks and airplanes, use hacking off the limbs of children or the torture with power drills as **psychological warfare**.

5. I do not see any proof that the twentieth century was the bloodiest of all. We simply know much more about its atrocities and the productivity of the murderous technology. They have been documented in all detail, photographed, and kept fresh in memory.

> I certainly agree with Niall Ferguson that collapsing empires release the worst miasmas from their former subjects. Does it mean that empire is a source of order and stability, as he apparently believes? Probably. Ferguson was even accused of being a kind of a neocon ideologue. A label and a battle banner instead of facts, analysis, and logic is the sure sign of postmodern polemics.
>
> The main conclusion I have drawn from my life experience is that we have to reject the primate of any abstract idea—whether democracy, or empire, or dictatorship, whatever—over the basic human needs. Am I completely sure that this is right? No. I do not know what is right or wrong, unless history leaves a record to judge on, but then the categories of good or bad lose meaning. To be happy is **always** good.

Looking back at my life during WWII, under Stalin, and further under the dictatorship of Soviet Politburo, I see that the adaptability of people to the pressure of circumstances is

enormous. What people need most is stability and hope. Nothing undermines stability and fuels hope as much as a new abstract idea, usually false one. Hope without stability is the most common source of bloody conflicts.

In short, I am for defense. I believe in a great moral and practical advantage of defense over offense. This could be a sign of age, of course. By attacking we always empower the enemies within and without. Defense gives us maximum freedom to think and invent, plus the right to believe in our supremacy. Starting an offense, however, we must be rough.

6. "Why do the men obey?" asks Niall Ferguson, following Leo Tolstoy. My answer is: because when a man considers a conflict with the state or tribe, he knows that the state or the tribe comes to his door as a **group of armed men**.

It is the same as to ask why we die. We face a much stronger opponent, we have no choice, and everybody dies alone.

When we join a group or an army, we regain stability and we hope that we will not die tomorrow.

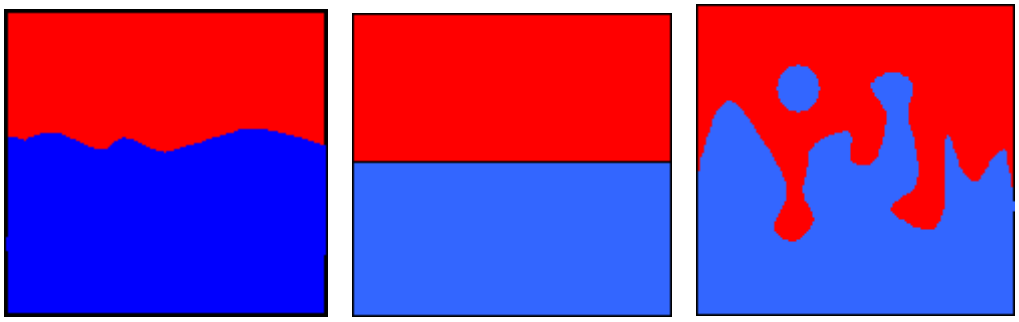
7. Although Niall Ferguson lists military technology among the causes of the "bloodiest century," he does not consider it a decisive factor. Nevertheless, he vividly depicts the role of railways in the initial stage of WWI.

From all I have read about WWI I conclude that the mere logistic and bureaucratic inertia of the huge mass of matter rolling with little friction across huge distances at high speed was one of the main reasons the great war could not be stopped. The American overseas wars with planes and ships instead of trains could not be easily stopped either. The speed is a kinetic factor. A whole host of new weaponry launched in WWII was a thermodynamic factor, especially, artillery in the field, on tanks, and in airplanes.

To stop a war is extremely difficult. On the contrary, to start a war one needs only to sign the orders and push a button.

3 Chemist on War

Consider a case of a standoff across the border between two enemies: **BLUE** and **RED**, **Figure 4**.



A **B** **C**

Figure 4. Borders between enemies. A: moderate, B: minimal, C: extended

The mutual animosity means that there is a **border tension** between the sides. Naturally, the longer the border, the more probable an armed conflict and the more pronounced overall tension. The border can be abstract. Thus, the length of an ideological border is measured by the number of disputed issues, or, better, by the sum of the intensities of all debated issues.

> Thus, the number of the disputed issues between Republicans and Democrats in the Cold Civil War may be quite insignificant. It is the intensity of the single non-ideological issue of who has the voting power that makes it so brutal.

When a conflict flares up, it runs like a chemical reaction in which the human and material resources are transformed into waste, which can be only partially rehabilitated and restored.

Border tension has a semi-permanent presence in the world news. The following data are taken from Google on November 13, 2006: Results **1 - 20** of about **30,200** for **"border tension"**.

TIME: The Korean DMZ Tension between the two Koreas escalates after the North tests a nuclear weapon. US and Mexico ease **border tension** Serbian **border tension** growing **Border tension** between Ethiopia and Eritrea has eased Syria Turkey **Border Tension** and Water dispute Scoop: **Border tension** between Ethiopia, Eritrea continues India and Bangladesh Confer On Reducing **Border Tension** Thai-Burma **border tension** eased **Border tension** as escape route to Syria stays open

A border can be sleepy or full of anxiety. Anxiety means instability. All things considered, the longer the border, the higher instability. **Figure 4** presents two extreme cases: a border of a minimal length **(B)** and a tortuous extended border that exacerbates all typical border problems **(C)**. The type **C** border is common for ethnic and religious maps and for unsettled areas like Palestine where it is, in my opinion, one of the few main factors of the initially local and later regional conflict turning into a global one

right before our eyes. A similar situation was a cause of the murder and exodus after the division of India and the first page in many other macabre chapters of world history.

Civil wars have the longest front lines.

The problem of minorities, including the origins of anti-Semitism, has roots in the pattern (ideogram) of border tension. Small groups of "different" people or, quite often, "different" individuals of high prominence are surrounded by an unmarked border, which can be sleepy or inflamed, too. It can be ethnicity, religion, class, flamboyance, intellectual superiority, arrogance, any other distinction that draws lines in rock, sand, or water of human interactions. The authoritarian state tries to reduce tension by instinctively "scientific" measures: the Pale of Settlement for the Jews in Czarist Russia, discrimination by race or origin, unsustainable colonial borders, internment of the Japanese Americans in WWII. All such acts substitute a group distinction for an individual one and in this way shrink the border.

The K-street project, the brain child of the Republican ideologues of the Bush II era, i.e., discrimination by party allegiance in the bipartisan democracy, was a typical border foray amid the Cold Civil War. To tell the truth, it was far from a national discrimination by political allegiance, but it was both a pattern and a seed of one of the traditional tools of totalitarianism. McCarthyism was another configuration in the same pattern. There are only a couple of steps from the K-street seed to the all-out political job discrimination and, by the way, political boycott of companies as a response. The CCW has a lot of steps to escalate, all the way up to HCW.

> **NOTE** (March 15, 2007). Here is the next step: Attorney General Alberto Gonzales fires US Attorneys for lack of anti-Democratic zeal. Surprisingly few people have connected the two dots.

Two traditional ways an individual can escape the personal border tension are emigration or joining a group.

> In 1636, Roger Williams, who had individual border tensions with the Massachusetts Puritans, founded my dear little Rhode Island, where another *different* personality, Anne Hutchinson found a refuge from border conflicts with the same drowning medium. During the midterm elections of 2006 the blue Rhode Islanders were torn between the genuine esteem for their incumbent Republican senator Lincoln Chafee and the Democratic candidate Sheldon Whitehouse. In the border conflict of the state with Bushism, Chafee found himself under a water-repellent coat and the Ocean State rejected him with a heavy heart. I felt proud of my impuritanic American roots.

I am catching myself on switching from border tension to the physical phenomenon of surface tension, which is exactly the ideogram I am trying to draw.

(Google, November 14, 2006: Results **1 - 20** of about **1,800,000** for **"surface tension"**)

When we put some salt, sugar, or alcohol in water, the substance dissolves because it has affinity for molecules of water and the solution is more stable than the heterogeneous mixture. It is not the same with oil and water: they separate. Furthermore, liquids and gases are both fluids, and the mixtures of water and air separate, too. The droplets of water have a spherical form in air, as if they were covered by a thin stretched rubber surface.

The surface tension arises on the border between immiscible fluids, when molecules of one type have more affinity to each other than to another type. They, so to speak, *feel good* (a metaphor for stability) among those like themselves. On the border, however, they have less neighbors of their kind than in the bulk, which decreases the stability ("feeling good"). This is the essence of surface tension for dummies. Surface tension needs at least one fluid and it exists also on the borders between fluids and solids. Negative solid-fluid surface tension means that a fluid freely spreads all over the solid surface, which is used for lubricating engines.

Serious sources on the Web use a similar language:

> Another way to think about it is that a molecule in contact with a neighbor is in a lower state of energy than if it weren't in contact with a neighbor. The interior molecules all have as many neighbors as they can possibly have. But the boundary molecules have fewer neighbors than interior molecules and are therefore in a higher state of energy. For the liquid to minimize its energy state, it must minimize its number of boundary molecules and therefore **minimize its surface area**.
> http://en.wikipedia.org/wiki/Surface_tension

Border tension and surface tension belong to the same pattern, for which I prefer more general **surface tension** as the label for the ideogram.

As another illustration of generality of the *surface tension* ideogram, I refer to the title of the book:

> **Meg Daly, *Surface Tension: Love, Sex and Politics Between Lesbians and Straight Women*. Touchstone, 1996.**

Obviously, it deals with situations on the surface between two social groups with limited miscibility, which all men and women, as well as adults and children exemplify, with scores of books on the subject, actually, most of the world literature.

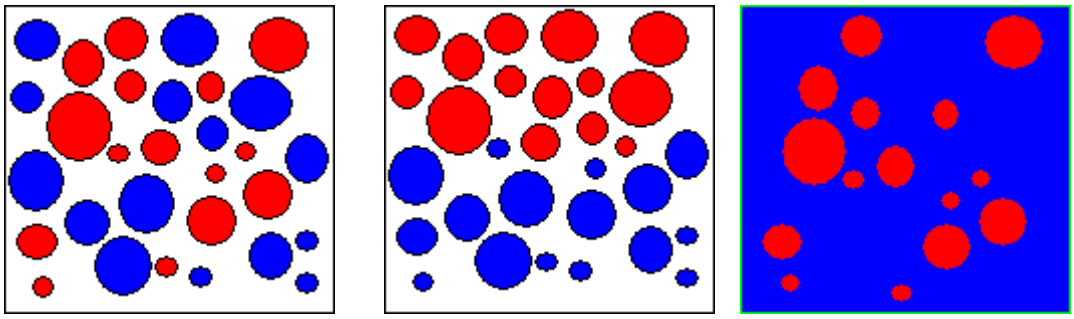
There is a universal and known since ancient times chemical way to reduce the surface tension between two liquids: soap, or, more generally, **surfactant**: a substance that has affinity to both incompatible media and thereby reduces the surface tension. Egg yolk in mayonnaise is a surfactant. Thus, numerous American political figures have tried to play the role of a surfactant in the surface tension between the Israelis and Palestinians, to no

avail, though. The name for a geopolitical surfactant is shuttle diplomacy. Weather, small talk, a cup of coffee, a joke (ice-breakers) are social surfactants.

> Even within the short span of twenty years I have been observing the constantly diminishing tension along the racial and sexual rifts of America. The most powerful surfactant was simply the public light under which the **idea** of tolerance can self-propagate, assisted by the power of personal experience and habit. With religion and politics, however, it was the opposite. During the Cold Civil War, George W. Bush did all he could to divide the country and increase surface tension between fractions of society.
>
> How can we increase surface tension? What is the chemical equivalent of hostility and intolerance?
>
> Taking the water-oil pair, we can do it by adding to the oil small amounts of a substance with a much greater surface tension in contact with water, for example, a silicone oil, known for its **water-repellent** property. Under surface tension as ideogram, all extreme and narrow views (complete ban on all abortions, complete ban on all prayers, war until victory) increase surface tension by generating intolerance and are met with hostility.
>
> Throughout history we see strategies of reducing **surface area**: dense Greek phalanx, Roman tortoise formation, compact medieval castles, fortified cities, colonization by conquest instead of settlement, and the American gated communities. Note that the reduced area increases stability, but does not mean a reduced intensity of surface tension measured as force per a unit of length. Centrism is the only reliable political surfactant, which does not imply its ultimate efficiency: without extremism it leads to stagnation. Eloquence is a powerful surfactant invented by the Greeks, employed by Martin Luther King and Ronald Reagan, and practically lost in current American politics.
>
> The evolution of the American two-party system in terms of surface tension could be a great subject for an undergraduate paper. Someday.

The social chemistry, like the molecular chemistry, has a whole array of factors that can influence social evolution, among them concentration, catalysis, temperature, and **pressure** (also an ideogram). In the Iraq war, the tension-easing function of American occupation was designed basing on fantastic ideas about the chemistry of the Iraq society. In the Palestinian conflict, the American affinity with the Jewish side (or pressure of various groups) was certainly higher than with the other, and the temperature of both sides was too high, with that of Palestinian side at the boiling point.

Figure 5 presents symbolic pictures of a tight (**A**) and separated (**B**) mixture of two abstract "liquids." The nonexistent void between the droplets is left for the convenience of graphics. An emulsion, as a fine mixture of two liquid is called, looks typically as (**C**). Figure **C** can be interpreted as terrorist or dissident cells, as well as xenophobic ethnic or political enclaves.



A **B** **C**

Figure 5. Mixture (A) and its separation (B). Emulsion (C) .

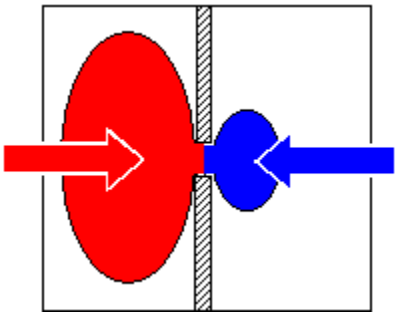


Figure 6. Thermopylization

The way to ease the overall surface tension in such systems in the absence of surfactant is to reduce the border to the **Figure 4B** type.

If we accept that the abstract surface tension is the main source of conflicts, the first recipe for reducing the threat to American interests is to shrink the border with the opponents. American physical presence in the world looks today like **Figure 5C**, with main globules in Iraq, Afghanistan, and Korea. The presence of terrorist cells in the West, of which nobody has exact knowledge, looks the same, only the size of the enclaves is minuscule. The only conclusion we can make is that the palestinization of the world, i.e., overstretching the border between the enemies as result of fragmentation and insularization of physical presence, is a source of increased danger. This is a consequence of globalization.

The excessive shrinkage of the border, however, leads to the bottleneck effect, for which I would prefer the term **Thermopylization.** I derive it not from the Greek root for heat but from the battle of Thermopylae (incidentally, from the same root). In 480 B.C. 300 Spartans and 1100 other Greeks delayed the advance of over 200,000 (some think millions) Persians for eleven days, with the fight locked in the narrow Thermopylae pass. The conflict looked as in **Figure 6**, which is another ideogram, related to **bottleneck** or **channel**. The small area of the direct contact of the warriors equalized their grossly unequal resources, although, of course, the Spartans were doomed.

Thermopylization is not the same as the kinetic control: in chemistry it is a kind of the **diffusion effect**. The kinetic bottleneck in chemistry means simply that the slowest process in a chemical system determines its overall speed—quite like in life, war, and business.

> The above effects illustrate the meaning of **ideogram**: it is a **very general** pattern that spans across the borders between **very different** complex evolving systems.

Political recipes are beyond me (nevertheless I will give one at the very end), but within the framework that the surface tension ideogram offers there are not too many choices.

Here are some:

1. Use of **surfactants**, i.e. negotiations with whoever occupies large and small droplets of trouble, from terrorists to dictators. The policy of the current government has been the opposite: erection of impenetrable walls, condomization, so to speak, of the rogue world, with military conflict as the only remaining option. Diplomacy is the most common international surfactant.

> I am wondering how to classify bribe... neither lubricant (it does not spread), nor surfactant (the sides are eager to deal). Just a transaction.

2. Cutting the lines of supply to the areas of conflict and communications within the area. De-globalization, i.e. localization.

3. Transforming the antagonistic medium by propaganda, the tool as powerful as intimidation by extreme violence, although slower. Both act upon the mind.

Figure 7 symbolically presents two kinds of propaganda effect

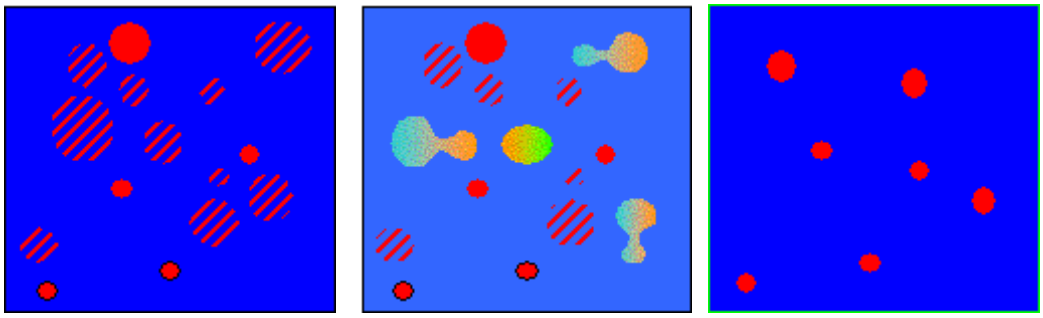


Figure 7. Propaganda by raising doubts (A) and by antagonizing factions (B). The desired result: domination (C).

Propaganda can decrease the resistance of the opposite sides by raising doubts in their own propaganda. I am convinced that it is currently the weakest part of the "war on terror." It was a powerful tool in the Cold War with Russia. Since propaganda works upon human mind, it should be developed by a sophisticated human mind. Since it should penetrate the surface between incompatible views, all said about surfactants applies to propaganda. Start with ideograms.

A threat and an offense can be counterproductive Thus, the cartoon in **Figure 8** ("*Your future, al-Zarqawi*") could only boost the will of al-Zarqawi's henchmen.



Figure 8

A piece of disinformation, once discovered, which is easy in our wireless time, undermines a whole batch of other disinformation. A promise could be somewhat better. But nothing works better than truth and logic, which I experienced on myself while listening to the Voice of America and BBC in Soviet Russia.

There is a lot of amazing material on propaganda and its over 100 varieties at the SourceWatch web site:

http://www.sourcewatch.org/index.php?title=**Propaganda**_techniques

http://www.sourcewatch.org/index.php?title=**Propaganda**

NOTE: Surface tension is a physical phenomenon. Only chemistry, however, relates physical properties to the intimate structure of molecules. This is the very essence of the chemical view of the world: it penetrates complexity, individuality, and uniqueness.

I believe there is no way traditional physics and chemistry can be applied to social phenomena. It can be done only in a more general framework of evolving complex systems (X-systems) based on the notions of structural complexity, novelty, uniqueness, and individuality.

4 Paul Revere and the Internet

Regarding the reasons for the Iraq war, we have to wait until the dust settles and the library shelves fill up with memoirs. I believe that George W. Bush could have some quite rational motives (Niall Ferguson in *Colossus* thinks so, too) underlayed with some emotional impulses, also understandable. I believe that the initiators of the war were driven mostly by their understanding of American national interests. I believe that when history enters a new phase it is rather difficult to interpret it. Nevertheless, there are always people who do it correctly and some who make mistakes. The best example I am aware of is the advent of Nazism. Those who had looked far ahead, left Germany in time. Regarding history, however, the only way to look far ahead is to look far back into history.

What I can see today as the main revelation of the Iraq war—while the whole nest of lies remains still unearthed— is political, technical, and military **incompetence** of the administration and, quite probably, of the army. My personal worst problem with this is that I, unlike friendly foreigners, cannot separate the administration from America.

I believe that America is in a new stage of history and not only because her environment changed. America is a large evolving complex system: a system with **novelty**. The historical novelty can always be outlined and formulated. Thus, the novelty of fascism consisted in the network of wired and wireless one-way mass media, fast transportation, and instant two-way communication. The novel technology was combined with historically traditional ideology of conquest, hate, and violence. The person who discovered and formulated the novelty knew it from the inside. He was Albert Speer, Hitler's Minister of Armaments, and he did it in his last word on August 31, 1946, before the judgment in Nuremberg was pronounced:

> Hitler's dictatorship differed in one fundamental point from all its predecessors in history. His was the first dictatorship in the present period of modern technical development, a dictatorship which made complete use of all technical means in a perfect manner for the domination of its own nation.
>
> Through technical devices such as radio and loudspeaker 80 million people were deprived of independent thought. It was thereby possible to subject them to the will of one man. The telephone, teletype, and radio made it possible, for instance, for orders from the highest sources to be transmitted directly to the lowest-ranking units, where, because of the high authority, they were carried out without criticism. (Albert Speer)

I read Speer's last word for the first time around 1960, in a multi-volume Russian edition of Nuremberg Trial documents. I immediately saw how well it applied to the Soviet Union and since that time I have not found a better short description of totalitarianism.

While typing the previous paragraph on my computer, I suddenly realized that Speer's discovery applies perfectly to the entire history of the twenty-first century, including America and the post-Soviet era. Although in a war with itself, America is a democracy, whichever accusing fingers are pointing at it and whatever fumes are rising from the Web. The role of the media and communication, new no more, but incomparably more powerful, remains the same. All over the world, humans are placed like iron shavings in magnetic fields that orient them along proper lines. In authoritarian societies there is only one magnet, while in America there are formally two competing sources of influence of different strength, painted blue and red over green. In fact, there are more: listening "to a higher authority" is another one. A complete lack of magnetic properties is yet another factor.

The same effect has been known for millennia without any radio and television. A detailed written code of daily behavior performed the ordering function in the form of Talmud and Koran. Today the novelty of the situation is that the interpretation, update, instruction, and correction to the code, regarding the current moment, can be delivered immediately all over the world and with visual illustrations. In tightly interconnected dense tribal society the deviations from the code are immediately visible to the clan. In an individualistic loose and scattered society the sinner may be easily in charge of an anti-sin department and it could take quite a time to discover the hypocrisy.

Postmodernity is about speed. It is driven by the kinetic control.

The great American Constitution was designed and written in the times when Paul Revere on horseback personified the Internet of his time. Today two years sounds like eternity, updating all concerns, fads, and lessons.

American life, which has been my own life for twenty years, is still amazingly stable. This "still" is an expression of my anxiety.

5 The Hangman's Bill

I promised a political recipe. Here it is, quite a trivial one: in order to win over terrorism we have to reduce instability caused by surface tension by straightening and shrinking the visible and invisible borders and by using human surfactants. If we strike, however, we have to strike hard, plugging our ears with wax against the voices of the political sirens.

This is not enough. X-systems depend on supply of energy. The Western and especially American dependence on oil and the transformation of oil into edible gold means that we are paying for the bullets that kill us. The terrorist **system** depends on our dependence. It bribes us.

Hitler made relatives of condemned prisoners to pay for their execution (see APPENDIX; I read a lot about such bills but this is the first time I see it).

The price of oil includes the premium for our funeral.

The price of the cheap stuff made in China includes a bouquet on the casket.

History is not for the faint of heart and feeble of mind.

APPENDIX 1

Between the next two horizontal lines there is an excerpt from the site : http://www.thelooniverse.com/books/kastner.html , by **harrie verstappen.**

(His page is licensed under a Creative Commons Attribution-NonCommercial-NoDerivs2.5 License.)

Hangman's Bill :

Reichsanwaltschaft beim Volksgerichtshof
Geschäftsnummer 4 J 777/44
— Staatsanwaltschaft —
Kostenrechnung
in der Strafsache gegen Erich Knauf

Gebühr gem. §§ 49. 52 SGKG für Todesstrafe	300,—
Postgebühren gem. § 72.1 SGKG	1,84
Gebühr gem. § 72,6 für den als Pflichtverteidiger bestellt gewesenen Rechtsanwalt Ahlsdorff, Berlin-Lichterfelde-Ost, Gärtnerstraße 10a	81,60
für die Strafhaft vom 6 4. 44 bis 2. 5. 44.	44.—
Kosten der Strafvollstreckung: Vollstreckung des Urteils	158,18
hinzu Porto für Übersendung der Kostenrechnung .	—,12
zusammen:	585,74

Zahlungspflichtig: Die Erben des Erich Knauf, z. Hd. von Frau Erna Knauf, Berlin-Tempelhof, Manfred-von-Richthofen-Str. 13, bei Fa. Gilbert, Mach.

To establish the proper atmosphere, this is as good a place as any to show a sample of the bill you got for having your husband killed by the Nazis for political, or any, reasons. Yes, *you* were supposed to pay for the execution (or else...) It comes to a total of what now must be well over $6000. They even charged you 12 cents for the stamp to send you the bill.

The document is the bill from a "State Attorneyship at the People's Court" sent to Erna Knauf for the execution of her husband Erich Knauf on May 2 , 1944. I removed the last two lines of commentary that did not belong to the bill.

The bill contains the following charges: fee for capital punishment, postal expenses, public defender's fee, cost of prison detention, cost of execution of death sentence, postal expenses for sending the bill.

APPENDIX 2

Yes, on January 25, 2007, it is too early to write history, but there is nothing too early to imagine.

Perk up, Hollywood: two personal stories of Shakespearean magnitude in one.

Imagine two leaders of two distant countries with bad blood–and good oil–between them. The countries are incomparable in their size, influence, and power, but the leaders turn out to be comparable along a mysterious hidden dimension of history: the dimension of foolishness.

The first leader, blinded by arrogance and narrow-mindedness, loses a block of his biggest city, starts a war with the second leader, loses a whole another city to forces of nature, sacrifices thousands of human lives, loses crowds of sanctimonious loyalists, destroys the power of his political party, loses trust of his people, and–we are right at the border between reality and imagination–loses a long war with a much weaker enemy. He sinks into history without any dignity.

As the story goes, at the same time, the second leader, blinded by arrogance and stupidity, provokes the war with the first one, loses his army, country, power, freedom, dignity, two sons, tens of thousands of human lives, and, finally, his own life, regaining dignity in the end, but leaving no appreciation by anybody.

2006



NOTE (2016). Reading this and some previous Essays, I cannot understand why I was so hostile to George W. Bush. Ten years later, I have no trace of that. But I can understand why my rancor is gone: I find no ill will in his presidency. I see no realistic alternative to his foreign policy. Today people justly, in my view, criticize Barak Obama for his weakness in the Middle East. But the alternative could be only more killed and mutilated Americans. This is how history works: it brings up hidden human motives and values, but it is always late to learn something from the lecture of the past because the present has already wiped up the blackboard. What we really need to understand is the future before it comes. Patterns are carved in stone.

Essay 48. Motives and Opportunities

PART 1: HISTORY AS COURT CASE, TASK, AND GAME



I contend that all cultures are built on fertile fallacies.
George Soros, *The Age of Fallibility*,
Public Affairs, NY, 2006, p. 27

I respect human fallacies: they are construction scaffolds to understanding, left in place after the building is completed. A fallacy can even outlive the building. Without illusions and delusions mixing into the substance of arts and humanities the colorful world would be black and white. The hard cold truth tells us about the world around us, but the fallacy is a window into our own minds, for as long as we cannot bore a hole in each scull.

But how to distinguish between the true knowledge and the fallacy?

A fallacy constantly splits and fragments into diverging versions while truth contracts, streamlines, and cuts off its branches. A truth can wither away, a fallacy can thrive and bloom, but the truth does not call for an army to defend itself, while a fallacy is always on somebody's battle banner—or worn on the sleeve. Fierce dogs guard a fallacy, stern gardeners attend to it, and a collection can is at the entrance. The truth is a dusty roadside apple tree, from which anybody can pluck a fruit.

Ideas of three modern prolific authors have attracted my attention as stand-alone phenomena of the new stage of human history: the stage of postmodernity. I have already reflected on it, but the problem of ambivalence regarding truth and fallacy still fascinates me.

Nobody knows what exactly postmodernity means because we have been living in it for a long time, but I still remember modernity as a civil religion of knowledge—knowledge as

the opposite of ignorance like honor as the opposite of shame. Moral ideals of modernity, as it looks from today, were inseparable from the concept of service (to science, humanity, beauty, nation, community) as a secular counterpart of worship. Today all that is an old man's car in the ageless culture of self-indulgence. You can drive it anywhere, but... Today is the opposite of always.

The roots of the apparently outdated modernity, never yet acknowledged as fallacy, can be traced back to the Greeks and the moral teachings of the East. The art of telling right from wrong and honor from disgrace is a fallacy exactly because it splits into contradicting schools. The question that makes me restless is whether this fallacy can lead us to any firm knowledge. Simply speaking, can we perceive and study modern history, still splashed with blood and reeking of putrefaction, without moral categories?

One of the advantages of my previous life was that the officially sanctioned Soviet Russian culture was enclosed within the classical walls of Antiquity, Renaissance, Enlightenment, and Modernity and protected by the iron curtain from the inflow of contemporary Western ideas. My ignorance of postmodernity ensured a contrasting background to my American impressions and made my discovery of America a great perpetual joy.

The tree highly stimulating authors for wider audience, whose books have been attracting my attention, are Noam Chomsky, Niall Ferguson, and George Soros. Their positions, neither a verifiable truth, nor a provable fallacy, exemplify some problems with our understanding of history. I am in no way critical about their ideas, but this is exactly the point: I lack any firm ground for a stance.

Noam Chomsky

Noam Chomsky approaches modern history with a strict code of justice and announces his **verdict** of "guilty as charged" for the aggressive American foreign policy. I am not going to analyze his books, the texture of which is a dense net of names, dates, places, events, and references to sources spooned out, along the taste of the author, from a vast cauldron of all countless and contradicting private opinions. He judges with a Roman Code of Law, where crimes and punishments are listed explicitly, not with the Common Law based on a precedent. He is both Prosecutor and Judge and there is no Jury.

One cannot argue with Noam Chomsky sarcasms unless by expressing yet another opinion, which is, of course, useless. My own opinion on a single particular issue, see **APPENDIX 1**, but a general question arises:

Question: how to judge history?

George Soros

I believe that George Soros, with whom I wholeheartedly sympathize, occupies a distinct and, probably, unique position among modern authors. This is how he himself describes his uniqueness:

> I believe I combine three qualifications. First, I have developed a conceptual framework that has given me a certain understanding of history, and, in particular, what I call far-from-equilibrium situations; second, I have a set of firm ethical and political beliefs; and third, I have made a lot of money. Many people have one or two of these attributes, but the combination of all three is unusual. (*The Age of Fallibility*, page x)

I would add more points of distinction. I regard George Soros as an experimental scientist in the area of "social chemistry." I realize, that memoirs of any high rank public personality can be seen as a lifelong experiment, but he:

(1) has been doing his experiments in the most recent times and in new and foreseeable in the near future environment, i.e., beyond archival significance,

(2) experimented with the most powerful form of social energy known in that environment: money,

(3) applied private money to non-profit political ends on large scale,

(4) combined empirical knowledge with a clear cut and concise set of general ideas,

(5) as far as I can judge, left an objective record of both positive and negative results of the experiments, all of them verifiable,

(6) did all that being neither a politician nor an academic, i.e., free from the guild codes of any kind,

(7) experienced life in both closed and free societies.

George Soros, the modern *homo faber* (see The Visible Hands: Homo Faber and the Chemistry of History), in fact experimented with history, trying to influence it not as a king, president, or gray cardinal, but as a private person. I would compare his stance with the **Archimedean promise** to move the Earth with a lever, given the place to stand on.

George Soros advances two clear ideas with which I not only sympathize but consider as fundamental as principles of thermodynamics: our inherent fallibility in human matters

and the principle of open to all ideas society that can at least partially compensate for the limitations of our individual judgments.

> The movement of heavenly bodies and the hatching of eggs occur no matter what we think about them. They are the objects of knowledge.
>
> The same cannot be said when we think about reality as a whole, or about phenomena that have human participants. When we ourselves participate in the events we think about, the complications become much more pervasive. Not only is our knowledge incomplete, but, more important, our imperfect understanding or fallibility becomes part of reality. (George Soros, *The Age of Fallibility*, p. 4)

There are two kinds of sensitive points on human body: hope and fear. Money acts on the hope points. Violence expects the response of fear. Both threat and reward have always been driving history, but, regarding the new environment that I have mentioned in my points, opulence and violence today take forms that seemed extinguished since the times of ancient despots.

Dispensing his wealth, George Soros has accumulated and shared a great experience, both positive and not less valuable negative one, with stepping on the money-sensitive points of the global body and using them to leverage history toward open horizons and in the direction of hope, pushing through unintended consequences.

To summarize, George Soros has formulated one of the most productive kinds of theoretical principles: another **principle of impossibility**, on par with the impossibility of eternal motion (or, for that matter, anything supernatural), and the uncertainty principle. Quite *naturally*, such principles can be met with disbelief and opposition, especially in the market society. You cannot get grant for research in impossibility. At best, you can sell an emperor's new clothes.

Question: What does it take to turn history around?

Niall Ferguson

Niall Ferguson sees human history at any moment as a set of alternatives. He is not pushing any grand theory and he never forgets to add a dash of irony to any dressing over raw facts. His speculations are always intriguing and stimulating. He seems to apply the all-encompassing syncretic approach to the long range history (*long durée* of Fernand Braudel) to short-range events.

As a master historian Ferguson invites the lay reader to learn through playing games and evaluating one alternative against another or, for that matter, against what actually

happened. Chess is the closest analogy for Niall Ferguson's vision of history and he has his own favorite gambits, for example, the imperial predestination of USA.

Question: What are the rules of the game in history?

The three views of history—as **court case** , **task**, and **game**—serve me as a triple point of departure for my own **chemical** view of the short range history, i.e., events commensurable with the span of individual human life. Since Herodotus, historians have preferred this time scale for the episodes of the narrative. Regarding the time horizon of active interests, kings, commoners, and chemists differ little.

But first a few words about the *long durée* (long run). All which can be said by physical sciences about it amounts to very general statements of non-equilibrium thermodynamics. In short, history, **probably**, is going to run its course while the sources of energy last and nothing unexpected happens. Thermodynamics is mute about the nature of the **course** and especially about anything **unexpected**. It is the unexpected, however, that is mostly responsible for the fallibility of social sciences. I call the unexpected **novelty**.

The unexpectedness of novelty is not absolute, but this is one of the most tricky questions in the area of simplicity-complexity ("Does novelty has a measure?" or "Is novelty predictable?") , to which I still do not have a good answer. I can only distinguish between the new and the different.

As an example of the thermodynamic view of history, I see the entire history starting from the initial spark of the Industrial Revolution in England as a process of accelerating burning of mineral fuel and using the energy for growing the mass of man-made things. **Technos**, which is a form of generalized non-chemical life, multiplies along a mutating template, competes, uses humans as enzymes in its metabolism, and dies.

Our civilization of things is, from the point of view of non-equilibrium thermodynamics (partly coming from Werner Heisenberg) , a single organism in which *homo sapience* performs two very different and formally contradicting functions: enzymatic order as realization (expression) of the template and creative chaos as source of mutations in the template. The template (genetic material) is the totality of all stored information, including science, ideology, culture, technology, and art, i.e., the blueprint and flesh of civilization. More about it, see The Visible Hands: Homo Faber and the Chemistry of History. Things are a life form and this is why I capitalize Things in this meaning. They include services.

Obviously, the explosive spread of the fire cannot go forever, which is the only reliably expected thing, and we are already **expecting unexpected** short-range consequences. In

the long run, life on earth will come to equilibrium with the supply of energy, whether we want it or not, and the growth of the garbage dumps, where our gadgets end up their short lives, will slow down. Most probably, this equilibrium will break down later, although we do not know in what way.

The main meta-chemical thesis is that the most probable state in the short run is that toward which the fastest processes—small local fires, so to speak—run. In the long run, a temporary **steady state** is the most probable. When economists and politicians speak about equilibrium, they mean, usually not even realizing that, steady state (a Guiney pig in a wheel), which for all phenomena in living systems is far from thermodynamic equilibrium. Sources of energy enter any social equation for *long durée*.

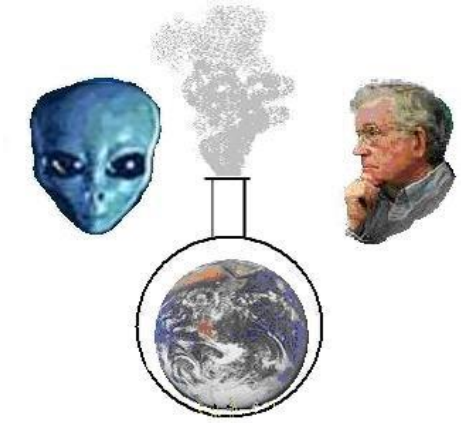
In the short run, however, we have much more options and the game of survival promises less gloom and more fun. Various local fires compete for the most abundant fuel and one can use various tricks to protect his own source of heat to warm hands and bring water for coffee to a boil. That the time of scarcity is a great business opportunity has been already noted in the press (and much earlier by Rhett Butler in *Gone with the Wind*).

Chemistry has its own peculiar relation with **the unexpected** that can pop up as reality in the future. The chemist can not only anticipate a novelty, up to a point, but also forcefully push it to reality ahead of other anticipated things. The chemistry of private life, business, and politics works by the same yet unwritten meta-chemical handbook. See The New and the Different and other entries in complexity.

In short, the chemist—modern Pygmalion—first draws a chemical structure—his Galatea—and then designs a practical way of bringing it to life, not relying on gods and chances.

Of course, this is what every inventor does, but let us remember that whoever invented life on Earth was a chemist.

PART 2: HISTORY IN THE GLOBAL FLASK



Following the principle of impossibility of supernatural causes, human history is a natural process and there must be some area of consensus about what it is, how it runs, where to, and why. But is it possible at all to have such consensus over something as complicated as modern history?

As a preview of possible areas of consensus-only as a hypothetical example-I can formulate the following , at first glance counter-intuitive,

principles, applicable only to very large **evolving complex systems** (X-systems):

1. The accuracy of predicting the future of a system increases with the complexity of the system.

2. The trend of a complex system is increasingly harder to reverse in the course of time.

3. Nevertheless, the trend of a complex system **always** changes with time, which is a property of all non-equilibrium systems.

The meaning of all three principles amounts to emphasizing the **inertia of complex systems**. As soon as the system becomes stable, i.e., close to a steady state or steady growth, its very complexity supports the trend, which always ends in a relatively fast or abrupt change. The property behind such inference is rather simple: the probability of many simultaneous independent events is very low.

> How low? As low as to have a US president who is good-looking, highly intelligent, widely educated, eloquent, tolerant, flexible, honest, good athlete, strong commander-in-chief, excellent leader, visionary, universally respected, even by the other party, adored by women, and a father of an equally outstanding family.

A complex system tends to remain the same because each change is mostly local and many such simultaneous changes are improbable.
As an evidence that such apparently lightweight principles, regardless of their validity, can have real scientific values, I quote tree out of seven The Golden Rules of Organic Chemistry formulated by Brent Iverson, Professor of University of Texas at Austin at his web site. [Unfortunately, the old links are dead - 2009].

> *2. The most important question in chemistry is: "Where are the electrons?"*
>
> *3. Nature hates unpaired electrons.*
>
> *4. Nature hates localized charges.*

As Brent Iverson justly notes,



Brent Iverson

These simple ideas explain a very large number of things about the way organic molecules interact. Thus, understanding the 7 Golden Rules will allow you to develop an intuitive feel for organic chemistry, and things will make sense! (Warning: this means you will start thinking like a chemist, but, of course, no one needs to know if you don't want them to know.)

As a chemist, I testify that examination of the above deceitfully naïve rules opens **to a student of chemistry**, an extremely complex body of knowledge, a way down to the very depths. A student can master chemistry exactly because its underlying principles are dramatically less complex than the immense bulk of chemical knowledge.

I enthusiastically cheer the following maxim of Iverson:

> *How to Think About Reactions*
> A good way to think about chemical reactions is that they are like crimes. Both crimes and chemical reactions need motive and opportunity to take place.

This is how I sometimes instructed my own students.

If so, then probably a good way to think about crimes, glorious and infamous human deeds, and historical events is that they are like chemical reactions.

The hope to find some firm and common ground in human matters seems to contradict the principle of inherent fallibility. In fact, by adjusting our angle of view and distance from the object we still can outline the limits for the fallibility itself. Let us start with distance.

~ ~ ~ ~ ~ DISTANCE ~ ~ ~ |< ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~>|~ ~ ~ ~

Reading *Hegemony of Survival: American Quest for Global Dominance* (Metropolitan Books, New York, 2003), I was intrigued by Noam Chomsky's casual hint to a possible solution.

> As an intellectual exercise, let's imagine how the "Stevenson moment" [discovery of Soviet missiles in Cuba in 1962] might be viewed by a hypothetical extraterrestrial observer. Call him Martian, and assume that he is free from earthly systems of doctrine and ideology (Noam Chomsky, *Hegemony of Survival*, p.75).

"Reflecting on this distinction, Martian should recall that..." This is how Noam Chomsky begins his argumentation. What follows further in the chapter is an illustration of how anybody's, even the imaginary Martian's, interpretation of history can be bound by doctrine and ideology, but it is beyond my point (see **APPENDIX 2**).

I find Chomsky's Martian approach very close to that of natural sciences: compare the state of the object at a series of consecutive moments of time and remove yourself from the picture. Recurring to the Martians for help, we thus eliminate one common source of fallibility, but there could be some price to pay. Thus, the Martian could not share our

yes-or-not view of formal statements and decisions, certainly not shared today by many sciences.

Consider three examples.

1. A chemical bond is either locked or broken.
2. The nut in human hand is either with a bolt inside or detached.
3. The candidate is either elected or not.

A single snapshot of all three **half-way** situations would not tell us anything about the direction and timing of the change. Two observations may not be of any help, either. In real life it is quite normal that a chemical bond is in the process of breaking up but it may remain intact indefinitely or immediately snap back. The nut is half-screwed on the bolt and can move in either direction because the worker changed his mind. Two presidential candidates could be waiting for something like the Florida recount of 2000.

Looking at an airliner taking off from Boston, we cannot tell for quite a while whether its destination is Seattle, OR, or Portland, WA. Similarly, after the capture of Baghdad we could not predict either the ultimate failure of the Iraq war or a triumphant victory, although the mood in Washington was predominantly optimistic. To support Chomsky's thesis, although Paris was not as far removed from America as Mars, the pessimistic expectations in that precautious European capital were well founded. Distance certainly helps. What about time?

~ ~ ~ ~ ~ **TIME** ~ ~ ~ ~ / ~ ~ ~ ~ ~ ~ / ~ ~ ~ ~ ~ / ~ ~ ~ ~ ~ / ~ ~ ~ **->**

Somebody knew for sure the destination of the airliner leaving Boston. This can be confirmed by facts leading us to the whole design and mechanics of air transportation. The ancient picture of the world included somebody who knew our destination in life and sometimes could even intervene in the journey. This, however, is not supported by either facts or the mechanism. The flight is natural because the development of aviation and a particular schedule are events of larger history. Or, to put it differently, the flight—event historically minuscule but potentially momentous for a passenger and sometimes even historically critical—could be traced back to it causes.

Thus the four flights on September 11, 2001, one of them from Boston, were of historic importance not visible at the take-offs. As it turned out, the flights were a culmination of a long story and still unfinished story The Iraq war has been one of the enveloping episodes.

It took two to three years before the true direction of the change in Iraq became visible in Washington, which does not mean it could not be changed. A modern Tamerlane (see **Essay 47: The War**) would create a democratic (or autocratic—whatever you pay for) Iraq in a jiffy, and, probably, with less overall bloodletting than Iraq was destined to suffer in American hands. But, again, nobody could tell for how long the result would

last. Strictly speaking, the American failure in Iraq is probable, but how probable—nobody can tell.

The distinction between fast and slow processes is the cardinal property of complex evolving systems. To understand what is going on, we need an ability to tune up our observations to variable time scale. Where in the long run we see a discrete yes-or-no instantaneous transition, like the abolition of slavery in America, a finer resolution shows a long and painful process. The dates of birth and death of a person in a reference can encase a long, glorious, but tortuous personal story.

The genetic template for molecular life, a particular cultural tradition, and a specific social template for a pre-modern society all developed on a time scale much longer than the individual life. The acceleration began in Middle Ages with the first medieval empires in Europe. The split within Western Christianity (Reformation) and the split within Marxism (Democratic Socialism) took less than a century. The unique Soviet Communist system was born and put to sleep within the time span of one human life. Modern civilization is dynamic: development of a product, tradition, ideology, and institution typically happen within a few decades at most. Major new technologies of the twentieth century were developed within one generation. Within a decade or less a technology becomes obsolete.

Chemistry has a peculiar relation with time, straddling the border fence between inanimate matter and human matters. The reason for that is that chemistry a science of transformations in complex systems. It holds the key to complexity of any kind.

~ ~ ~ ~ ~ **CHEMISTRY** ~ ~ ~ / ~ ~ **A—B** ~ ~ / ~ ~ ~ ~ / ~ **A B** ~ ~ ~ / ~ ~ ~

If the similarity between the state of a chemical bond, the fate of the bolt and nut couple, and the outcome of election looks convincing, we can take the chemical case as a kind of a model of an event, or a pattern of a transformation of complex systems.

The list of configurations under the pattern can be expanded indefinitely. The outcome of any modern marriage is as close to basic chemistry as it could be. In the same vein, presidential campaign invokes wooing the voter as if he or she were a sweetheart, the outcome being defined by chemistry as well as calculation. Finally, the war has its own chemistry, in which full of life human beings turn into a pile of corpses.

Chemical reaction would look like a suitable **ideogram** (a clear-cut case of a general pattern, see complexity) were it not too complex for an average reader. Unfortunately, chemistry is not yet a popular science, while an ideogram requires simplicity.

I consider organic chemistry one of the simplest (as well as complex; but both cannot be said about physics in the same breath) and most consequential sciences. It is terribly misrepresented and misunderstood at high schools and colleges (not so at the University

of Texas at Austin), but I am powerless here. I can only recommend The New and the Different, and History as Points and Lines in spite of all their shortcomings, as an extended parallel between chemistry, Lego, and everything else.

I have, however, a candidacy of perfect simplicity for an ideogram of a change. The original idea comes from Ulf Grenander, who analyzed pattern properties of stories in his works. In History as Points and Lines Ulf Grenander and I gave some examples.

I had run recently into a book (Christopher Booker, *The Seven Basic Plots: Why We Tell Stories*. New York, London: Continuum, 2005) that provided me with a non-trivial ideogram for chemistry, history, and everything in between: **story**.

History consists of stories, fairy tales are stories, and literature is a collection of stories. Well, *Waiting for Godot* and intimate poetry may be not; but what are they? Manufacturing a car is two separate stories: concept and design of the model and assembling it from the parts (each part with its own story). A war and a war movie are stories, both, like making a car, with design and execution stages, although somewhat intermixed. Obviously, history is a story, but what about chemical stories?

There are two basic stories in chemistry. A typical **experimental** story describes a chemical reaction in the lab, beginning with the description of starting chemicals, sometimes, their origin and purity, equipment, and all consecutive operations such as mixing, heating, cooling, filtration, distillation, crystallization, etc., see **APPENDIX 3**. A story can be very long, consisting of multiple chapters, as it is the case for most complex pharmaceuticals. It looks more like a movie script than a novel. Its detailed description can be reproduced, verified, and possibly improved by any other chemist.

We encounter another type of a story in **theoretical** chemistry, in which we are interested with what actually happens with participating molecules, how the transformation starts, what bonds break up and lock in which order, what are alternatives (which usually run simultaneously in chemical reactions), what increases the speed of the transformation or slows it down. This kind of story requires a lot of imagination. In most cases we cannot see what actually happens, except for the beginning and end, and the chemist has to reconstruct a crime without witnesses.

I wish to emphasize that the chemist who works in chemical synthesis often designs a molecule that has never existed (stage 1A), designs a way to bring it to material existence (stage 1B), and then actually materializes it (stage 2). If unsuccessful, the chemist designs another way and in the absolute majority of cases succeeds. If not, the molecule is too **unstable**, which does not happens too often.

In the same words—design of the goal, plan of the way to it, and its realization—we can describe any human venture, whether public, or private, or personal.

In History as Points and Lines we discuss the chemistry of one of Goethe's books (p. 258). Here I would take a different example from Ovid, a great poet of Ancient Rome. (Born: Publius Ovidius Naso, 43BC- around AD17).

~ ~ ~ ~ **OVID** ~ ~ ❤ ~ ~ ~ ~ ~ ~ ~

In **Book 1** of *Metamorphoses* Ovid tells the story of Io, a beautiful daughter of a river god. She tried to flee from the passion of Jupiter.

> But the God
> called forth a heavy shadow which involved
> the wide extended earth, and stopped her flight
> and ravished in that cloud her chastity.

Goddess Juno noticed the cloud and, experienced in such matters, suspected her husband.

> But Jove had known
> the coming of his queen. He had transformed
> the lovely Io, so that she appeared
> a milk white heifer-formed so beautiful
> and fair that envious Juno gazed on her.

A rich, intricate, and moving story follows (which I omit with regret). In the end, Juno decides to return Io to her human form.

> And now imperial Juno, pacified,
> permitted Io to resume her form, —
> at once the hair fell from her snowy sides;
> the horns absorbed, her dilate orbs decreased;
> the opening of her jaws contracted; hands
> appeared and shoulders; and each transformed hoof
> became five nails. And every mark or form
> that gave the semblance of a heifer changed,
> except her fair white skin; and the glad Nymph
> was raised erect and stood upon her feet.
> But long the very thought of speech, that she
> might bellow as a heifer, filled her mind
> with terror, till the words so long forgot
> for some sufficient cause were tried once more.

A parallel between chemical and poetic transformations first occurred to me while reading Ovid in my youth. About the same time I found out that the Chinese characters for **chemistry** meant **transformation (change) science**. Most characters are the same for both languages.

CHEMISTRY: 化学 **kagaku** (Japanese) , 化學 (also 化学) **huàxué** (Chinese)

NOTE: The Chinese interpretation of the characters here comes from the excellent site zhongwen. It is a gateway not only to a language, but also to the workings of an ancient but surprisingly modern human mind.

Japanese language, which uses Chinese characters, was my first contact with **ideograms**. Thus, the character 化 consists of two side by side parts having independent symbolic meanings. The right element in **huà**, "transformed," by the way, is the same sign as the "person" on the left, only upside down. It gives the character its pronunciation ("phonetic").

化 huà
Person 人 transformed 匕
transform, change

The character **xué** consists of three components arranged vertically. The top part (hands) is the phonetic component that determines the sound. The middle component, ⺍ means roof (cover). The bottom part means **child**. (with tightly bound lower part).

學 [学] xué
Hands 臼 (phonetic) reaching down through covered ⺍ mind to teach

Many years later, under the influence of Pattern Theory (Ulf Grenander), I came to see ideogram as a tool of understanding evolving complex systems. In Pattern Theory it is called **template**, a typical configuration that can be transformed into other regular configurations of the same pattern. I simply expand it over abstract ideas—something that Rene Thom first attempted to do. For details, search complexity.

子 zǐ zi
Pictograph of an infant, legs bundled together.



Back to Ovid. He was very thorough in his descriptions of transformations. The story of Io is slightly irregular because Ovid omitted the description of the initial transformation when it actually happened. Instead, Ovid described the **reverse** transformation from heifer into human form in his usual step-by-step manner, as chemists report their stories. By the way, elementary acts of chemical reactions are in principle reversible.

I hope I do not violate copyright by presenting here a beautiful illustration to the story of Io.

It is borrowed from the site of Frank Horvat who published, among others, a series of photos along motives of Ovid.

> EXERCISE: Looking at the picture of Io on the left, we cannot tell the direction of transformation. But we can always tell whether a large bridge is in the state of building or dismantling. Why?

I bring together Ovid, Chinese characters, and chemistry in order to illustrate—rather than formulate and define—my favorite idea: we might have a better understanding of the complex world by complementing the exact scientific knowledge, the less available the more complex the object, with a **vertical** pattern view that does not recognize borders in the cognitive plane. This cannot be achieved by presenting any comprehensive theory or, for that matter, anything considered scientific in the classical tradition of reproducibility of knowledge. Understanding is a process of movement toward a common language rather than common closed logical system: a walk toward the receding horizon.

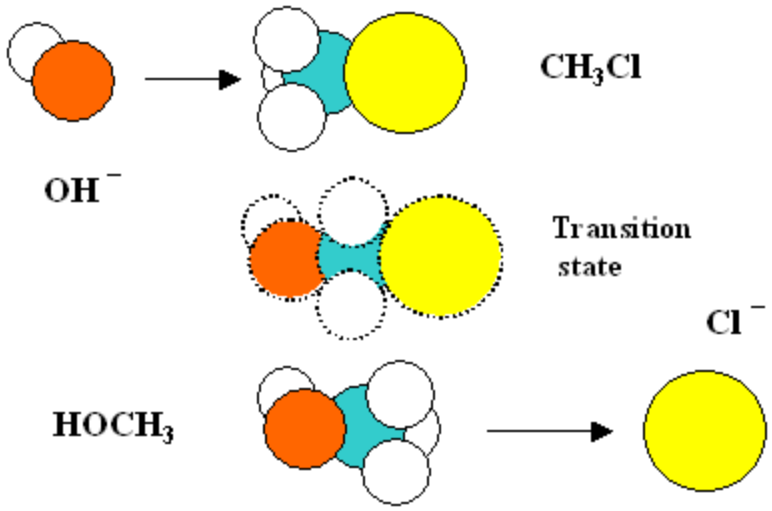
A common language of discussion, therefore, is the necessary condition of understanding, and my three examples in **Part 1** show that as far as history and humanities in general are concerned, there is no such language. To have a common language in arts would be a disaster, as much a disaster as the absence of common language in complex human matters.

> The linguistics of the use of characters in Chinese and Japanese languages is much more complicated than any simplistic summary. Nevertheless, in vague terms, the **origin** of the Chinese system of writing exemplifies a kind of a tool for mutual understanding based on visual symbols for ideas rather than phonetic signs. One possible—but not sufficient—reason is the limited number of syllables in Chinese language: about 400, or 1000-1400 with tonal variations.

PART 3: CHEMISTRY OF INSTABILITY

Brent Iverson's site has a collection of animated movies portraying various chemical transformations.

One of the movies (Substitution Reaction) consists of three parts shown schematically as three lines of the following picture.



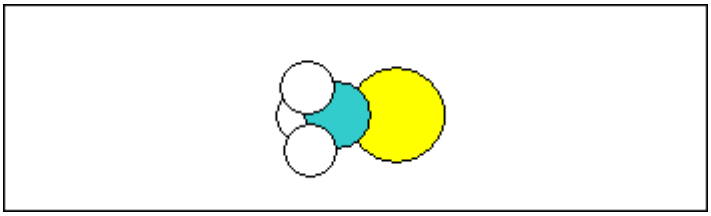
This is what happens in the movie:

1. The red and white hydroxyl HO moves toward methyl chloride CH3Cl.

2. The collision leads to a formation of the short-living transition state.

3. The transition state rearranges and splits chloride Cl .

The following very primitive animation illustrates what happens in principle, but not in detail.

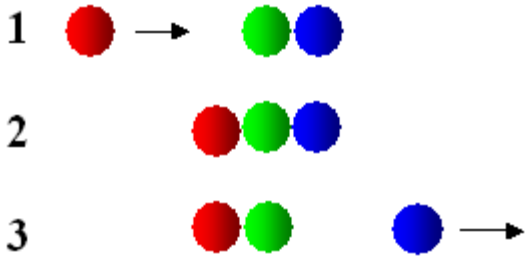


ANIMATE ← click

The transition state in the above pictures is not directly observable, quite like a typical crime in a thriller and often in life. It was originally deduced in 1935 (Edward D. Hughes and Christopher Ingold) by examination of the entire evidence. It remains a classic detective story of chemistry, in which a pair of gloves (really!) plays a decisive role.

The process somewhat reminds a collision of a billiard ball with two adjacent others. The collision itself (line 2) is very short as compared with the preceding and subsequent movement of the balls.





On transition state see also **Essay 23. On the Architecture of Change** and complexity.

← In comparison with the spectacular *Terminator* movies, the chemical transformation may seem unimpressive. It takes some preparation to see that the chemical movies show-for a short time-the same chimeras as blends of humans and wolves in the werewolf movies or a human shape and a machine (or metallic fluid) in the Terminator movies.

A typical story—variations are possible—starts with some ordinary and stable way of affairs. Suddenly, or within a short time, life becomes perturbed and confused and the colliding characters are drawn into a chain of events and configurations over which they have no power. Stress and confusion at some point reach maximum, after which the tension and uncertainty are resolved and life of the main character, if he or she survives, returns to a new or the same routine. In horror movies the viewer sometimes is warned at the very end that the quiet life will not last.

Crane Brinton in his *The Anatomy of Revolution* (New York, Random House, 1965) described revolutions in terms of a fever that starts out of the blue (not so unexpected with a hindsight), flares up, reaches the climax and ends up with a convalescence, not without a few relapses, guaranteed to the revolution but not all its participants.

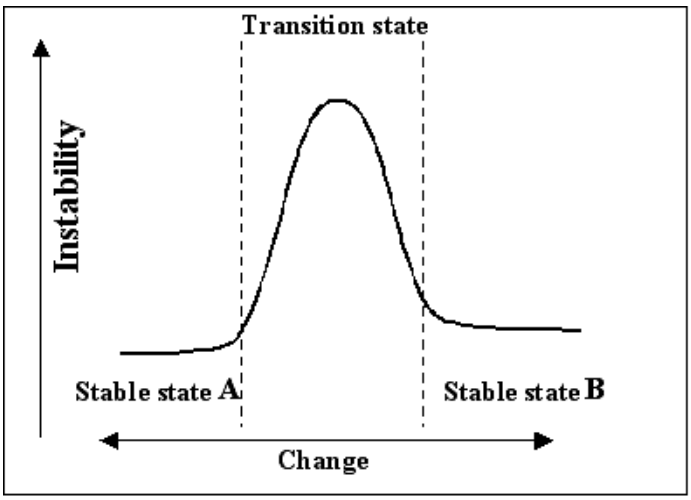
The world wars and the subsequent Vietnam and Iraq wars have been always read as horror stories. The Iraq war, increasingly nightmarish, is the ongoing live example of a story. The only good thing is that all such stories end, not necessarily happily. Unfortunately, wars are the chain smoking of the globe.

Leo Tolstoy, long before modern historians, used the chemical metaphor of ferment to analyze the large scale historical events like the Napoleonic wars.

Similarly, a chemist takes from the shelves some liquids or crystals that could sit there for years, assembles some simple equipment, and pushes the starting chemicals into a chain of complex internal transformations and external manipulations. The chemist ends up with a new set of liquids or solids, one or a few of which are labeled and put on the shelf and the rest are discarded.

Having issued the order to invade Iraq, President Bush, started a historical chemical reaction between two very different human substances. Historians will record its outcome and put the record on the bookshelves, but today, in 2007, we are still in the middle of the long story, with many thousands of discarded human lives, wasted resources, and mangled equipment. In the language of chemistry, we are in the transition state from one stable way of life to another, more or less stable than the previous one.

What the movie *Substitution Reaction* does not show is the change of stability during the transformation. It looks like this:



I do not want here to go too deep into molecular matters of chemistry proper. I could not do it better than Brent Iverson's *The Golden Rules of Organic Chemistry* , but he addresses students of chemistry with some relatively advanced knowledge. Instead I will further discuss some aspects of history as if human matters were a chemical phenomenon with "motives and opportunities," not necessarily criminal ones, although the word **criminal** has already been used in references to Iraq war.

Noam Chomsky denounces American foreign policy certainly in terms of criminality, but he is not interested in the theoretical chemistry of human motives and opportunities.

Comparing chemical reaction with crime, Brent Iverson means by **motives** thermodynamics: chemical reaction is driven from one stable state to another more stable state. The transformations of molecules can run toward a less stable state, but less stability means that the descent to more stability is **more probable** than the opposite ascent.

Zillions of individual molecules come to equilibrium. As individuals, however, we do not make statistical ensembles. Thus, we constantly run into awkward and even dangerous situations in our private and professional lives, but most of the time we try to extricate ourselves from them and return to stability, whether old or new. This is why we enjoy thrillers and adventures: all the excitement without real danger.

Instability does not last: this is one of the basic laws of nature.

Molecular life and human matters are full of instabilities—this is another one.

Corollary: instabilities are visible in detail only on a fine time scale.

By **opportunities** Brent Iverson means the obstacles to the transition from one stable state to another. Thus, a democratic and, most importantly, America-friendly Iraq, hosting American military bases and pumping oil to America, would look like a haven of stability in the turmoil of the region. That was a **theoretically possible situation**. To support that vision, there was a lot of positive experience with such chemistry in the post-WW2 Germany and Japan.

The transition from the besieged but arrogant Iraq to the final vision was designed, as in many chemical transformations, in two stages: military and reconstructive.

The chemistry of military operations in America is a well-developed area of knowledge and equipment. The military stage was smooth. The occupation stage, contrary to unfounded expectations, ran into great obstacles because of the American ignorance of the chemistry of the same explosive Middle East substance that the President and his confidants wanted to turn into wrinkle lotion. There were enough knowledgeable chemists regarding the motives and opportunities of the region, but they could rarely be seen and heard outside the Charlie Rose show. It became a lost opportunity.

The ethnic and religious differences in Iraq, the rise of the civil war, the insufficient American military presence, and, most important, incompetence of American civil and, probably, even military leadership, about which history has the last say, created impenetrable barrier—the lack of opportunity—between the initial state and the final vision of the leadership. That vision did not contradict any laws of nature. There had been also an auspicious regional precedent: transformation of Turkey into a predominantly secular state by Kemal Atatürk, which was done by rather forceful methods in 1923-1938.

By saying that, I express a less harsh judgment about the current (2007) presidency than many other observers. I would reload part of the blame on the modern American commercialized e-election system that, through TV, computer, and phone **elects the most electable** candidate instead of the best fit for service. This system, as the last years have demonstrated, has an obvious bug: the presidency can become uncontrollable under the overwhelming power of his political party—an ominous parallel with dictatorships.

Unlike dictatorships, of course, the same system periodically empowers the voters to fix the bug at least for a while. But what if the bug evolves, as some creature from space in a Sci-Fi movie?

Political chemistry is quite close to the molecular one. The leader has a vision, sets it as a goal, designs the way (strategy) toward the goal, sets the reaction in motion, and changes the strategy or tactics in case of an impending failure. The strategy cannot do much with

the motive (some important chemical technologies work with low or negative thermodynamic motivation), but it can do a lot with opportunities by influencing unstable transition states.

By definition, the transition state is fleeting and ephemeral. Moreover, it is a chimera, half-Io and half-heifer—an illegitimate, feeble creation, not the Centaur who is fit for life. It is doomed to complete the transformation, rarely reversible in political matters, so that **the window of opportunity is very narrow**. Besides, molecules move and collide on their own, but people, equipment, money, and information have to be moved.

> **NOTE** (2016). This is why only a few people clearly saw the coming Great Recession of 2008. This is the Cassandra effect that manifests again and again through history.

The election campaign of 2004, like all the other recent campaigns on my memory, had spectacular moments of irreversibility when the fate of the candidate was decided by a few thoughtless words or even a single word—an evidence of the inefficiency of the e-campaign.

Not waiting for the end of the story, I would say that the American failure in Iraq was a result not only of obvious ignorance, illiteracy, narrow-mindedness, and arrogance, but also of more specific causes:

1. The military is not supposed to do political chemistry. This was often noted. The president, however, has an organic aversion to diplomacy.

2. Lack of flexibility, which comes from the lack of wide and open discussion and just from intellectual laziness, results in missed opportunities. I think that the Commander-in-Chief has demonstrated this shortcoming in full measure.

3. The most important reason, however, is the almost pathological, cataleptic lack of dynamism. In chemical matters, whether human or molecular ones, it is the speed of competing processes that decides the short run outcome. As far as the long run is concerned, what will happen in twenty or fifty years is completely beyond human power.

4. The previous point has its own partial reason: military campaign was subordinated to political interests. I believe that was an unintended consequence of the Constitution. The founding fathers could never anticipate an American war on the other side of the globe.

I believe that any successful CEO would do that part of the presidential job much better.

CONCLUSION

My personal goal here has been to present a program of three points, a part of the larger program **Chemical View of the World** , repeatedly commented at complexity and complementary simplicity , both intersecting in this Essay:

1. Complexity of the modern world is overwhelming. The problem of complexity is the first obstacle on the way toward solving other global and national problems and transition to stability.

2. Sciences and humanities must keep looking for a common language not only between the two divided sides but also within humanities, where such language does not exist.

3. Chemistry—and Pattern Theory as generalized chemistry—is equipped to deal with complexity from the position of simplification. Metaphor, analogy, ideogram, pattern analysis and synthesis, and something else that we do not yet see can be tools for utilizing chemical experience in human matters.

This program can be realized not by any grand theory or by a grand prophet, but in the process of discussion and exchange between professionals in particular areas—to whom I do not belong—who find the program worth a thought.

For my previous attempts to formulate this kind of a program, see :

TIKKI TIKKI TEMBO: The Chemistry of Protolanguage , The Rusty Bolts of Complexity, and others at complexity.

Finally, I will try to answer— half seriously— the three questions posed in **Part 1**.

Question: how to judge history?

BY ABILITY TO MINIMIZE INSTABILITY.

Question: What does it take to turn history around?

MONEY OR VIOLENCE, TWO PATENTED WAYS TO MANIPULATE TRANSITION BARRIERS.

Question: What are the rules of the game?

RISE THE TRANSITION BARRIERS ON THE UNDESIRABLE PATHWAYS, LOWER THE TRANSITION BARRIERS ON THE DESIRED PATHWAYS, AND BETTER DO IT QUICKLY.

Thermodynamics tells us that in non-equilibrium systems, to which all forms of life on earth belong, including human matters, our task is to take care of order. Nature will take care of chaos.

> **NOTE**: I omit here the factor of temperature, which is discussed many times elsewhere at this site.

There are also other untouched aspects to which I may return. I am interested, in particular, in:

1. Illustrations of the kinetic nature of history.

2. The practical value, if any, of the ideas presented here and in complexity.

3. "The three questions" in depth.

4. Survival chances of the American civilization in global change.

5. An amplified picture of some recent and current transition states.

6. Is a new ideology possible?

APPENDIX 1

As a counterexample, I venture to present my own opinion on the subject of international justice.

Within a framework of a state or a tribal society, law or tradition defines the difference between the just and unjust. It would mean little without a court or at least a judge ant the apparatus of enforcement. There is no such international law, common tradition, and enforcement. The United Nations does not count, as its entire history testifies. Obviously, as Chomsky illustrates again and again, America violates its own declared principles, and

so does everybody else. If so, to change this basic reality may be as futile an intent as to make *perpetuum mobile*. And yet somehow America is not the worst place on earth and it has even enjoyed long periods of stability, respect, and influence, never losing the attraction for immigrants.

Noam Chomsky's invective against America can be easily sympathized with, at least in part. The last couple decades have culminated in the shameful feast of incompetence and drastic decline of American prestige, which, of course, is in the eyes of the beholder, as anything else in the political arena. Irregular alternation of rise and decline, however, is the only law of history that knows no exception. As Winston Churchill noted, "You can always count on Americans to do the right thing—after they've tried everything else."

The precedence of universal international interests over national interests seems to me the main idea of Noam Chomsky, and as an atom of this nation I am entirely for the **precedence of national interests**. I am also for the precedence of the national interests of other nations with which I sympathize over the interests of aggressive, violent, and intolerant governments and group. I have no other choice in the absence of the world government, comprehensive world court, and world prison. It does not mean that I give a blank check to my government or to any particular party. Just the opposite, I am as disgusted by the American politics of the last six years (2001-2006) as Noam Chomsky, and probably even more, because I have been sensitized to government idiocy by my previous Soviet life. I begin to understand, however, why most Americans take it much easier: to wander and stray is the natural mode of scouting the future in a democracy that always argues with itself.

APPENDIX 2

Noam Chomsky, having introduced the Martian, further writes that the Martian would not recall any "Khrushchev moment." The Soviet UN Ambassador had not made any comparable to Adlay Stevenson's (US Ambassador to UN) "moment" about the preceding placement of the American rockets in Turkey. In fact there was enough display in the Soviet Press, which I well remember, but Khrushchev preferred to made practical steps in Cuba.

About the historical episode, see http://en.wikipedia.org/wiki/Cuban_Missile_Crisis and other numerous sources. Noam Chomsky justly notes that Russia did not plan to invade Turkey. He does not recall, however, what the Martian must have remembered: the Soviet subjugation of Eastern Europe, penetration of the Third World, and the general global Communist doctrine. All that ultimately culminated in the invasion of Afghanistan. By that time the Russians had enough rockets, but it was as much a failure as the American invasion of Cuba when America had an overwhelming military advantage.

APPENDIX 3: CHEMICAL STORIES (can be skipped)

Like the stories of crimes, revolutions, discoveries, depressions, and reforms, like novels and movies, they are sequences of actions displaying in time and performed by humans and their tools.

The following two stories are taken from the site Organic Syntheses , intended for professionals. http://www.orgsyn.org/ . Comments in square brackets are mine.

STORY 1

SYNTHESIS OF 6,9,12,15,18-PENTAMETHYL-1,6,9,12,15,18-HEXAHYDRO(C_{60}-I_h)[5,6]FULLERENE

link (attention! very long)

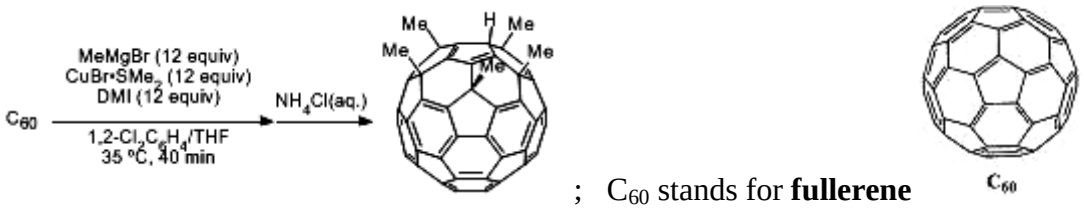
[COMMENT. This is the title of the story: the long word in red is the name of the product which is obtained from C_{60}, known as **fullerene**. Any chemical name is a word of an artificial language. It uniquely identifies the structure of the molecule. A picture of the molecule can be reconstructed from the legitimate name] .

Submitted by: Yutaka Matsuo, Ayako Muramatsu, Kazukuni Tahara, Madoka Koide, and Eiichi Nakamura [COMMENT. They wrote the script of the story and actually performed what the story describes, somewhat like the playwright, director, and actors]

Checked by: Peter Wipf and David L. Waller [COMMENT. The story was independently checked for truthfulness]

Published in Annual Volume 83, page 80 [Anybody can verify, use, and improve it, but not at home]

[COMMENT. The following picture is the concise visual representation of the story. It tells the chemist what happens in a nutshell. Some main participants are shown above the arrow and the secondary ones, such as solvent and catalyst, as well as the physical conditions, are below].



; C_{60} stands for **fullerene**

[**COMMENT**. Here is only the beginning of the story. I break it into scenes as if it were a movie script:]

A 200-mL two-necked, round-bottomed flask (Note 1) connected to a vacuum/nitrogen manifold through a three-way stopcock is equipped with a Teflon-coated magnetic stirring bar, a vacuum/nitrogen inlet, and a glass stopper.

A microcrystalline sample of [60]fullerene (2.00 g, 2.78 mmol) (Note 2) is placed in the 200-mL flask and the apparatus is flushed with nitrogen.

The glass stopper is replaced with a rubber septum, and 1,2-dichlorobenzene (90 mL) (Note 3) is introduced into the flask via a syringe under nitrogen.

The rubber septum is again replaced with a glass stopper.

The reaction mixture is cooled with an ice/water bath and stirred under reduced pressure (1 mmHg) for 30 min to remove dissolved oxygen.

Then the flask is flushed with nitrogen and warmed to room temperature (approximately 23 °C).

["To be continued"]

[COMMENT. Example of the notes that record the tiniest details of the story for the purpose of reproducibility]

2. Notes

1. All glassware was dried in an oven (110 °C), assembled, and allowed to cool under nitrogen atmosphere. All solvents used for workup need to be degassed by N_2-bubbling since the final product as well as the intermediate are susceptible to air oxidation.

[**COMMENT**. The next story is much longer. It consists of three separate episodes.]

STORY 2

SYNTHESIS OF 2α-BENZYLOXY-8-OXABICYCLO[3.2.1]OCT-6-EN-3-ONE BY [4 + 3] CYCLOADDITION

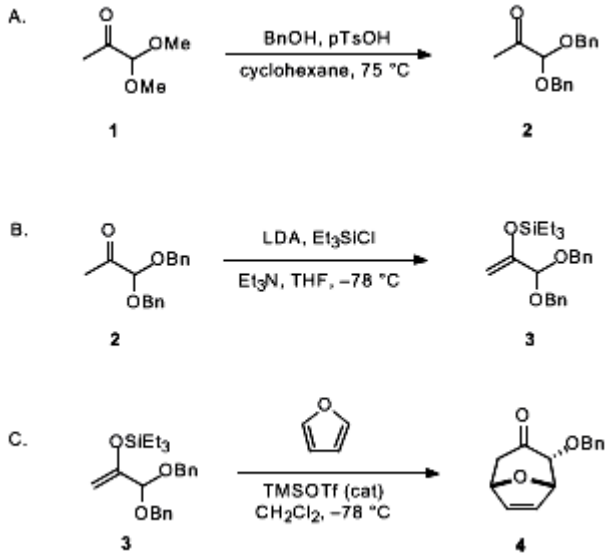
link (attention! very long)

Submitted by: María Vidal-Pascual, Carolina Martínez-Lamenca, and H. M. R. Hoffmann

Checked by: Timothy E. Long and Marvin J. Miller

Published in Annual Volume 83, page 61

[COMMENT. The following picture presents three stages: 1 turns into 2 (Stage A), 2 into 3 (Stage B) and 3 into the final 4 (Stage C). It is similar to three consecutive adventures of the hero whose soul—or fortune—undergoes a radical transformation as result.]



[**COMMENT**. Here is the first episode (**A**) . I omit the next two].

A. *1,1-Bis(benzyloxy)propan-2-one* (2).

A one-necked, 100-mL, round-bottomed flask equipped with a magnetic stirring bar is charged with pyruvic aldehyde dimethyl acetal (12.1 mL, 100 mmol) in cyclohexane (50 mL), benzyl alcohol (22.8 mL, 220 mmol) and *p*-toluenesulfonic acid monohydrate (0.95 g, 5 mmol) (Note 1).

The resulting mixture is heated at reflux for 2 h using a Dean–Stark separator for the removal of methanol.

When the reaction is complete (approximately 2 h), approximately 8.1 mL (200 mmol) of MeOH is obtained.

The reaction mixture is cooled to room temperature and washed with saturated potassium carbonate solution (25 mL) and water (20 mL).

The aqueous layer is extracted twice with cyclohexane (2 × 50 mL).

The combined organic phase is dried (Na_2SO_4), filtered, evaporated and the crude black oil is purified by column chromatography using a 10-cm diameter column packed with 900 g silica gel (Note 2) and eluting with 2.1 L of MTBE/cyclohexane (1:20) to afford keto acetal **2** as a yellowish oil (22.3 g, 83%) (Note 3).

[**COMMENT**. Example of a note]

1. Pyruvic aldehyde dimethyl acetal was purchased from Acros Organics.

Benzyl alcohol was purchased from Lancaster. *p*-Toluenesulfonic acid was purchased from Aldrich.

2007

NOTE (2016). Just one year left to the Great Recession, which is still felt ten years later. That has been an ongoing story, which is predicted to repeat as pattern.

The stories of Hitler and Mussolini are being recalled by some observers of the ongoing US Presidential Election campaign.

Essay 49. Terrorism and its theorism

In January 2007 I decided to read something on Islamic terrorism. I chose *Journey of the Jihadist: Inside Muslim Militancy* by Fawaz Gerges (Harcourt, 2006). I was attracted by the word ***inside*** in its title.

Before opening the book, I gave myself a couple of days to think on my own about the subject. I had already touched upon it in **Essay 26. Terrorism: The Other Side of the Hill** (October 2001), under the powerful and by that time fresh impression of 9/11.

I divide this Essay into:

Introduction
of an awkward but practical term *theorism*, which I use instead of a shorter but even more awkward term ***ism***,
improvisation,
i.e., my initial perception of the problem, not biased by the literature, then
re-examination
after having read the book and under the influence of some other literary sources abundant on book shelves and on the Web, and, finally,
recapitulation.

PART 1: INTRODUCTION

As, probably, many witnesses of 9-11, I am fascinating by the phenomenon of modern Islamic terrorism. If I thought its reasons were complex, I would trust the professionals to decipher them. But terrorism attracts me as any mystery that, as I suspect—and mystery novels confirm—hides some **simple reasons** (**Essay 28**). I feel compelled to test my **chemist's view of the world**® on this menacing problem. Global warming, pandemic of bird flu, pandemic of religious fanaticism, incompetence of government, entanglement of humans in webs spun by electronic devices, loss of privacy, and, as if all that was not enough, terrorism—it sounds like the end of the world, at least **as we know it**. In history,

however, the end of the world-as-we-know comes every day. History is about novelty. Understanding novelty is the major aspect of my personal program at spirospero.net .

Let us use the generic term **theorism** for all the **isms** behind socio-political movements that call their devotees under a banner and often push them toward a gun rack: Anarchism, Extreme Evangelicalism, Fascism, Islamism, Leninism, Maoism, Marxism, Separatism, Extreme Zionism, etc. With so many *isms*, one more can sneak in unimpeded. I wonder if after the Iraq war Democratism will jump on the bandwagon out of the obscurity of big dictionaries.

> Democratism means:
>
> **The principles or spirit of a democracy**
> in http://www.answers.com/topic/democratism ,
> **Democracy as a principle or system**
> in "The Oxford English Dictionary, Volume IV, Clarendon Press Oxford 1989, Second Edition,
> **the theory, system, or principles of democracy**
> in Webster's Third New International Dictionary Volume I, G.&C. Merriam Co. 1981
> The last two references are from http://de.wikipedia.org/wiki/Demokratismus (in German). The page remarks that *democratism* is used **approvingly** in the English language sphere and **pejoratively** in German.

I see **theorism** as a logical bridge from belief to action. **Theorism** is not a theory. It is a small bundle of basic statements, a credo that claims a certain logic. Thus, neither religion nor democracy is a theory, but its political use implies a certain theorism, i.e. an inference from a dogmatic (or, as scientists say, axiomatic) ideological premise, the truth of which is beyond discussion and doubt. Theorism is an interpretation in terms of action, not reason. Sacred texts cannot be modified, but their application to daily life can.
Theorism puts an idea above basic human needs.

Examples of theorisms: capitalism must go by revolution (Marx), private property must go by violence (Lenin), the world must live by the sacred books of Islam (Islamism), the culture of the past must be destroyed (part of Maoism), all Jews must live in Israel (extreme Zionism), the government must go (Anarchism), the state is above the individual (Fascism, Leninism, Maoism), people united by language and culture must have their own state (separatism, nationalism, Putinism), people should not be allowed to end human life at any stage (Christian-Right-ism). Any religion and political ideology can grow a violent theorism, although, of course, not all of them do. This happens even if non-violence is part of religion, as Ahimsa in Hinduism. Even non-violence could lead (a great paradox!) to violence, as Leo Tolstoy's extreme non-violence would do in WW2.

A superficial look at the theorisms from **A** to **Z**, reveals obvious similarities:

1. The theorisms partially overlap.
2. They partially contradict each other.
3. They have internal contradictions.
4. They split up into factions.

5. There are endless arguments among scholars, ideologues, and leaders about them.

As far as particular theorisms are concerned, they contain some standard blocks:

1. There is only one true ideology.
2. Society should live by a universal code of behavior.
3. The true ideology must be not only professed but practiced by behavior.
4. The true ideology must be spread or at least advertised and promoted.
5. The deviants should be killed, punished, or banished.

Finally, each theorism spells the political code of **behavior** which always goes beyond the ideological code. Neither the Bible nor the Koran say a single word about America, abortion, stem cells, or sects of Islam. The theorisms are: Kill the Jews. Kill Americans. Kill the abortionists. Kill Shiites. Kill Sunnis. Kill Christians. Kill Muslims. Kill Hindus. Expropriate the expropriators. Proletarians of the world, unite. *Deutschland über alles*. End embryonic stem cell research. No right to die. Execute murderers. All those simple slogans are extreme forms of theorisms. They are not universally followed by the rank and file believers, but the zealots will always find a sergeant to drill and lead them.

Ideology is not just an ethereal abstract meme, but a quasi-living species. It competes with other species for the place in the minds and needs a **source of energy** like any other life form. The theorism is its organ of survival, an extremity of its body, a claw, a fang, or a stinger.

If we add to that the persistent contradiction between ideology and action, a wide scale of intensity and violence, evolutionary and opportunistic drift, and invariable political inconsistency, the mad entanglement of the global humanity into its own messy diversity and subversity has a potential to

turn a rationalist into a cynic,
make an irrational one a fanatic,
drive a realist into apathy, and
give to an opportunist a great chance to make money.

For the lack of a better label, I probably can be best of all characterized as surrealist, just to distance myself from the cynics, fanatics, escapists, and opportunists.

As compared with the last two great wars—Hot World War II and the Cold World War—the ongoing Terror War (which is, in essence, a Hot Cold World War) is an indisputable fact. This war has been aggravated by the Cold Civil War in America.

PART 2: IMPROVISATION

I am coming back to the subject of terrorism after more than five years. As always and everywhere within my spirospero.net, only partially excluding poetry, I am in no position of an academic, adviser, doomsayer, soothsayer, expert, guru, oracle, prophet, problem solver, scientist, tutor, and visionary. I am interested in understanding evolving complex systems (X-system; ***exystem*** would be a fine term) as a general phenomenon of nature. What to make out of it is up to professionals.

Here is what I think about the nature of any episode of history, without repeating basic ideas, which I reduce to **Figure 1**. For its interpretation see **Essay 48. Motives and Opportunities** . In short, **motives** correspond to the projected gain in stability and **opportunities** inversely depend on the projected height of the transition barrier, i.e. loss of stability from the initial state to transition state. In human matters we never know the validity of our projection until the *post factum* analysis. I believe this is what George Soros calls the principle of fallibility (see **Essays 46 and 48**).

The analysis of events in human matters rarely leads to a consensus, creating a double fallibility. My general intent is to explore a possibility of a unified approach from positions that are still not only completely off the beaten track in the study of complexity but also safely hidden behind the roadside bushes.

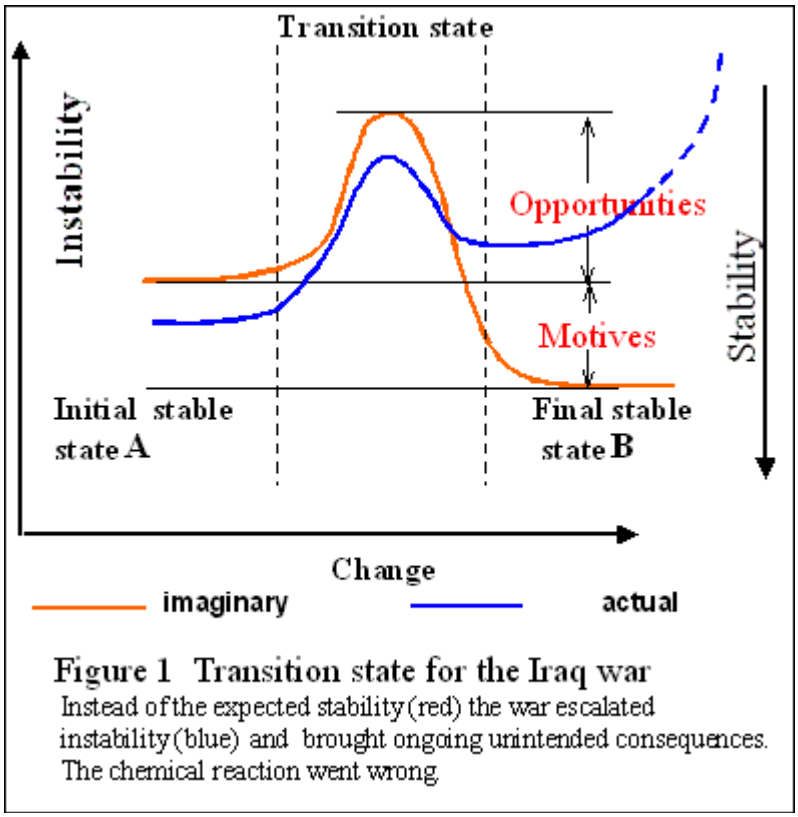


Figure 1 Transition state for the Iraq war
Instead of the expected stability (red) the war escalated instability (blue) and brought ongoing unintended consequences. The chemical reaction went wrong.

The man has to do what the man has to do. In an off-street language, when you make up your mind, you overcome the barrier of action, if only you have the guts to do it. But expectations and reality may differ and as a rule they do. You can get into a big mess, unless you are a big pro. While **king** is a profession, **US President** is not. On the contrary, terrorist can be a profession, often disposable, with *FREEDOM FIGHTER* on the business card.

Here is my **improvisation** in the form of theses:

I. Individual act of suicidal terrorism (small scale event):

1. Overcomes the unstable transition state between two stable states.

2. The high transition barrier of the act is stabilized by:

(A) Tribal connectivity (social capital, tribal nexus, etc., in short, the influence of the closest neighbors in a configuration, in complete agreement with the balance theory in psychology),
(B) The vision of the final state as more stable (paradise, rewarded family, honorable status of martyr).

3. Transition is made (or naturally is) irreversible.

4. The transition is alleviated by the high stress of the initial state. The factors of initial instability are the strongest known human emotions of shame, honor, hate, love, pride, etc.

II. Suicidal terrorism as historical trend (large scale event):

1. Apparatus of stabilization of individual transition states, against the counteracting fear of death, is supplied by energy in the form of money.

2. Terrorism has the capitalist organization pattern: it deals with supply and demand, budget, profit, efficiency, growth, logistics, CEO culture, security, competition, etc.

4. Transition state is stabilized by clear simple ideas and stimuli:
(A) Negative : occupation by enemy, offense,
(B) Positive: honor, promise of paradise, family security.

III. External terrorism against "enemies" is complemented and sustained by internal terrorism within the tribe

Any ideology is by definition totalitarian, even the ideology of democracy, in the sense that it tends to proselytize, spread, and to denigrate opponents. Instead of the harsh

"totalitarian" I would concede to "competitive." But even an American TV commercial is a little totalitarian artifact. I remember only two neon ads in Moscow of 1960-1970: DRINK TEA and GLORY TO KPSU (Communist Party).

Tribal, militant, hateful, and intolerant ideology suppresses evolution of the system and eliminates, often physically, its internal—or external—enemies, dissidents, or just non-participants.

Examples: Soviet and Nazi systems, the stories of Salman Rushdie, Oriana Fallaci, Denmark cartoons, van Gogh murder in Netherlands, and scores of daily news.

Remembering my life in totalitarian Russia, I find the internal tribal terrorism the main reason for the export of terrorism. In the USSR it was practiced by the state.

The roots of the tribal terrorism go back to barbaric, from our point of view, customs, partially extinct (giving some rationale for optimism), from Old Testament stoning to Islamic "honor killings" of unfaithful women, from American lynching to Saudi beheadings, and from Spartan infanticide to Indian burning of the widow. The value of human life in tribal societies has a variable, not a constant, measure, a market value, so to speak. Open societies are coming gradually to the same idea, but from more technical considerations.

PART 3: RE-EXAMINATION

This transition state approach to events is typical for chemistry, although some physicists have already suspected (see **APPENDIX 1**) that the theory of transition state is as universal as thermodynamics: it applies to any dynamic system, i.e., a system in motion, from a bacteria to you, reader, and to cosmos.

Naturally, the same applies to any human act, from the most benign to the most malicious, and from any suicide to any murder. Similar ideas in psychology belong to the area of **theories of balance**. I greatly doubt, however, that psychologists and chemists realize their hidden kinship.

While thinking on the problem, I discovered a large volume of literature on the Web on the origin of terrorism, its statistics, and theory of balance in psychology. I was struck by how chemical one of the recent formulations of the concept sounded:

> Structural balance theory (Heider, 1958; Cartwright and Harary, 1956; Newcomb, 1961) is viewed as a set of generative mechanisms for changes in dyadic ties that create trajectories of signed networks in a coherent fashion. Further, the macro-structures (in terms of subgroup memberships) place constraints on the actors as they make their affective choices. The joint dynamics of tie formation (and dissolution) and evolution of group structures are the focus of our attention here.

Hummon, N.P. and Doreian, P. (2002): *Some dynamics of social balance processes: bringing Heider back into balance theory*. *Social Networks*, **25**, 17-49. http://diagrams.org/docs/pdfs/d00055.pdf

These simple (at least to me, see **APPENDIX 2**) ideas may seem obscured here by the academic lingo, but what they tell us is that psychologists are intellectual relatives of chemists. This, however, is a separate big topic, only slightly touched upon in History as Points and Lines, **Chapter 21**.

The subject of terrorism, like anything related to evolving complex systems (X-systems or *exystems*) such as life and society, has two aspects: individual acts of terrorism (small scale events, usually numerous) and the historical trend of modern Islamic terrorism as a system (large scale events, always singular). See **APPENDIX 3.**

I value books not only by the answers they provide but also by the unanswered questions they point to. I had not found answers to all my questions in Favaz Gerges' book because the *inside* in its title promises much more than it delivers. Nevertheless, it was not only a good introduction for a layman like myself: it opened a whole host of questions.

The book presents a Swiss-cheese outline of the problem, which holds its overall shape in spite of the holes. Thus, I have learned about the two-phase history of Islamic terrorism: from the struggle against their own secular governments to the struggle against the West and America in particular. On the other hand, the problem of the violent, as seen by the Westerners, character of Middle-Eastern societies and the relation of violence to the Koran has been practically dismissed.

I have not found in the book any answers to the main package of question I address to the entire already large literature on Islamic terrorism, expecting answers from inside:

> What is the way of life of the terrorists dispersed among population as well as—and especially—teaming in camps?
> What makes the young people, *al-shabab*, charged with male hormones and ambition, to live in the camps, often in remote, inhospitable, and isolated areas?
> Where are their women, mothers, families, and friends?
> What are their food, entertainment, privacy, hygiene, sex life, small group structure, and ethnic relations?
> What are their conflicts, attractions, secrets, punishments, and rewards?
> What are their relations to the leaders and to each other?
> What do they talk about? What do they dream about? What are they afraid of?
> In other words, what is the cultural anthropology of terrorism? What is the **culture** of Islamic terrorism?
>
> **NOTE** (March 14, 2006). Later I found answers to most of these questions in truly extraordinary for many reasons *From the Terrorists' Point of View: What they Experience and what they Come to Destroy* by Fathali M. Moghaddam (Praeger

Security International, Westport, CT and London, 2006). This book could be entitled *Analytical Chemistry of Terrorism.*

And yet the book made a strong impact on me from an unexpected side. I felt myself at home (former Soviet home) among the terrorists!

The more I have been digesting my impressions of the book, the more I felt enveloped by a sensation of *déjà vu* . The cloud of familiar fetid atmosphere, from which I escaped from Russia twenty years ago, arose from the pages of the book. I felt my bronchia contracting and skin itching. Which makes me quote my own book:

> I know that if any ideology takes the place left in the world by communism, it will be orthodoxy and fundamentalism. In the algebra of history the C-word [i.e., Communism] stands not for Marxism-Leninism but for the rule of orthodoxy and fundamentalism of whatever content.
>
> Yuri Tarnopolsky, *Memoirs of 1984* . Chapter 15: *From Russia with Allergy*. (University Press of America, 1993)

Today I have doubts about such terms as orthodoxy and fundamentalism because they come in multiples in any ideology. Orthodox Christianity is no more orthodox than Catholicism. The Shia Islam is no less orthodox than Sunni Islam. Wahhabism, the most "orthodox" from the point of view of purity, is in fact, among the youngest branches of Islam. Liberalism can be as orthodox as conservatism. This is why I prefer *theorism*, a live amoeba stuck to the dead shell of ideology.

In *Memoirs of 1984*, Chapter XIV, *The Pyramid*, I suggested that the Soviet totalitarian system was a quasi-religion based not on thought control, as it was seen from the West, but on monitoring attendance and behavior in Soviet rituals (see **APPENDIX 4**).

As any religion, the Soviet ideology needed some kind of priests. In the Soviet religion that role was performed by *partorgs* (short for "party organizer" *partijny organizator*), i.e., the lowest level of party functionaries. The formally elected by Party members *partorgs* were complemented by a network of *seksots* (secret collaborator, *sekretniy sotrudnik*), recruited informers who reported their observations to the Secret Police (KGB). Both *partorgs* and *seksots* were just **common employees** who worked like anybody else and performed their monitoring functions in addition to their formal jobs, without any immediate reward.

"I value communal rights more than individual rights. In an Islamic state, the individual is not free to do what he wishes. There are limits ordained by God's laws, which supersede any human authority," one of the terrorist of the first generation said to Favaz Gerges (p.53). This philosophy of the beehive and anthill was exactly the core of the Soviet official moral: the individual must subordinate his interests to the interests of the tribe. The tribe size can vary from the family to the country to all the believers of the same creed in the world. Proletarian solidarity was the Soviet equivalent of Muslim solidarity; proletariat was the fictional Soviet *ummah*.

The collectivist spirit of Islam, the Islamic "pervasive sense of camaraderie and instinctive magnanimity" (Gerges, p.149) that was seen in Soviet Russia of the first decades, slowly declining afterwards, is one of similarities between the two collectivist ways of life.

> Evenings are longer than the days in the Arab world. Relatives and friends routinely drop by unannounced. In many family homes, for example, as many twenty friends and relatives might drop in every evening and stay well past midnight. And it would be unseemly if one did not try to convince a guest to stay still longer. The idea of community is not taken for granted, nor is it a matter for debate and discussion (Gerges, p. 148).

Scale down this picture in time and space a little, and you will get an insight into the Soviet life of 1950-1960, when the cities were much more compact, overcrowded, and telephone was a luxury.

It would be interesting to find recollections of Muslims who visited Soviet Russia at the peak of its Red pride and compare them with the impression of the "vapid landscape" found by some Muslim purists—and some pride-pinched Russians—in America.

If not similarities then parallels between early Soviet Russia and Islamic communal and messianic way of life, militancy, idealism and sacrifice, in Gerges' book are striking. To my ear, the quotations seem literally translated from Communist Party speeches in Russian to Arabic and "back" into English, with only the proper names rewritten.

> "Fighters had sweet dreams of fulfilling their duty to God and Prophet. Who could resist the magic of jihad and martyrdom and courage and sacrifice?... Who could resist the dreams of reestablishing the caliphate ... an Islamic state encompassing Muslims from Senegal to the Philippines?" (Gerges, p.112)

> "We had dedicated ourselves to jihad, and the matter was finished. Our mission in life is to protect the ummah wherever we are able to go." (Gerges, p. 126).

During the Russian Civil war, the two fighting sides, the Reds and the Whites, sang the same folk song of the WW I, but in different versions. As the Red Soviet revolutionary song goes,

> Hear, worker,
> The war has begun:
> Drop your work,
> Get ready for a march.
>
> We shall go bravely to the battle
> For the Soviet Rule
> And we will all die
> In the fight for that.

One of the stanzas of the White version sounded:

> Russia has been flooded
> By alien forces
> We are dishonored
> And the temple is desecrated.
>
> We shall go bravely to the battle
> For the Holy Russia
> And we all spill
> Our young blood.

Substitute **Muslim land** for **Russia**, **Islam** for **Soviet**, combine the first White stanza with the second Red one, and the battle hymn of Militant Islam is ready.

> Muslim land has been flooded
> By alien forces.
> We are dishonored
> And the temple is desecrated.
>
> We shall go bravely to the battle
> For the rule of Islam
> And we will all die
> In the fight for that.

This is a great example of what **pattern** is: it can travel through ages and lands, religions and cultures. This is why pattern is the key to understanding history and complex systems in general. That was the idea of Ulf Grenander when he initiated *History as Points and Lines*.

Here is a magnificent example of pattern perception of history from Gerges' book:

> Afghanistan in the 1980s provides an Islamic parallel to the enormous tent and tabernacle gatherings of the Great Awakening in eighteenth century New England, where ecstatic Christians gathered to proclaim and reassert their holy mission to build a "new world" guided by divine providence (Gerges, p.110).

Here is another example:

> In 1989 the Russians retreated from Afghanistan. Rather than disband and go home, thousands of Afghan veterans felt so empowered by having defeated one of the world's superpowers that they embarked on new militant adventures. Fighters and campaigners became unpaid mercenaries. It is a story as old as human history (Gerges, p.113).

Favaz Gerges lists other historical examples. I want to add one on my own. The role of the Freicorps, the organizations of veterans of disbanded German army defeated in WW I, in the emergence of Nazism is not widely known. After I had learned about it from a rich and illuminating book *The Orientalist*, by Tom Reiss (Random House, 2006), in which a small footnote might be worth a heavy volume, I found on the Web more material not only about the Freicorps, but also on direct parallels between the pre-Fascist Germany and the rise of both Soviet Communism and Islamic terrorism as result of the movement among war veterans.

The parallels do not end here. Favaz Gerges gives us a cursory look into the internal struggle between the fractions, conflicting interests, and contradictions within the militant Islam that match rather closely the historic way of Soviet Communism toward decline.

> The Lebanese Civil War did not pit mainstream Muslim against mainstream Christian. On both sides those who led and sustained the fighting came from the fringes; they saw the war purely as an opportunity to seize power. Sectarianism, communitarianism, and asabiya, or group and tribal solidarity, were ways of grabbing a bigger share of the pie, meaning control of local and national bureaucracy (Gerges, p.76).

And yet there is a point where the parallels diverge.

The Holy Russia was one thousand years old. The Soviet Rule lasted about 70 years and, more important, was condemned by history, at least for now. The restoration of the glory of the Holy Russia in a modified and modernized form seems now the official grand goal of Vladimir Putin's government, with its old Soviet habits. Condemnation, indignation, and emotions in general are a very poor way to understanding, however. Alas, there is no such thing as impassionate history. I wish a Martian-American could someday write it. **See Essay 48**.

History has two timelines: one of revolutions and the other of tradition. The question that I want to pose is whether the Militant Islam is a revolt against or an assertion of the tradition. The question is entirely rhetorical, but it gives us a two-dimensional space to position various historic events.

To give an example, the Russian Revolution was extremely radical, but, paradoxically, it resurrected the Russian tradition of slavery. The Chinese Revolution was culturally even more radical, but the tradition of individual farming in the countryside was affirmed.

> **NOTE**, March 10, 2007: Private property has been actually restored in China by the decision of the last Party Congress.

The problem is that we can write history only as historians, i.e., *post factum*. It is the function of the politician to award labels ahead of time. And God knows how the judgment of history will look in times of New Ice Age or Hot Flooded Earth. The danger of regarding history in terms of good and evil is that good and evil drift, fuse, and split

like tectonic plates, so that you lose track of the initial colors which, by the way, are seen differently by different eyes.

Favaz Gerges:

> It is a Manichean view of life—believing that human history is shaped by a titanic struggle between absolutes of good and evil. There is Islam and the Islamic way of living, and there is Satan, ever-present evil that is forming cells of corruption and debauchery in the form of democratic, secular politics. For a Godly life to be possible, its enemy must be annihilated (Gerges, p.43).

The important question that has been left out in the book (the author should not to be blamed for that) is the contradiction between the loyalties to the small tribe (family) and the big tribe (clan, ummah). This problem always arises in revolutions and civil wars, cutting across families and tribes. The waves of fiction literature that spread from the tsunamis of revolutions heavily exploit this dramatic subject, which is a very hard nut for an academic investigator.

I am coming to the core maddening problem of terrorism, especially, the suicidal one.

Obviously, the powerful natural instincts in human nature require humans to treasure the life of closest relatives, friends, and their own. There are extreme and infrequent situations in which these instincts can be blunted or suppressed. But what can suppress them on the incredibly wide scale that we witness in the Islamic terrorism of our time, in Palestine and Iraq?

I have a three-part answer that I do not claim to be original.

1. The first part is inspired by one of the most revealing and dramatic documentaries I have ever seen: the chilling *Jesus Camp*. The **technology of brainwashing** has made another step since Hitler and Stalin: it **became privatized**. You buy the plastic brain shapes, a pack of some sticky gooey pieces and you can impregnate–rape is the best word–the young mind with the sperm of an idea of sin that nests in the brain, waiting for the moment when sin nests side by side. You can prepare the child and a young adult to a war and let him or her wait until the moment when the enemy is named by the last name and the child can bear a real machine gun or a real explosive belt.

Some last stages of this technology are illustrated by scores of examples in African civil wars, in addition to Iraq and Palestine. The ideology itself does not matter. What matters is the pattern, the theorism: an irrational idea that is given precedence over basic human needs.

2. The second part complements the first. The brainwashing itself is not sufficient to explain the virulent hate and violence. It is the constant internal terror that suppresses dissent and natural human values of life, well-being, and posterity, the **loyalty to home**, the closest circle, the smallest and dearest tribe. People in a harsh tribal culture are not given any choice.

I ask myself a test question: what is the difference between the terrorism of the Communist or Nazi state and the Islamic terrorism?

My answer is that both Communist and Nazi ideologies came as **revolts against traditions**. Islamic terrorism marches under the banner of affirming and **protecting the tradition** with which the society had been in harmony for centuries, slowly moving toward modernization.

3. The third part belongs to the category of simple reasons, of which stupidity is always the simplest reason, but greed comes next. The grave and unforgivable errors of the current arrogant presidency, the greed, incompetence, and corruption of the government, its contractors, and subcontractors matched the efficient determination, mad cruelty, barbarity, and violence of the terrorist sergeants unencumbered, unlike the Americans, by the bureaucracy of the state and paid by the oil dollars.

It looks like history as usual. But where is the novelty without which there is no history? In many ways Islamism reminds Russian Communism with *assabiyya* instead of international solidarity. It is certainly a form of totalitarian ideology which, I emphasize, uses the yardstick of behavior control to impose **artificial selection** on the population. The first condition of the selection is to assemble the herd under one roof—or in an enclosure. The pattern of **selection** , whether in a temple or in the concentration camp, is the same. You don't read minds: you watch the behavior and look at the zeal. You grope for the muscles and look at the teeth.

The novelty is that Islamism acts in the name of tradition. Islamism is a conservative terrorism on world scale. Its theorism is **defense and preservation by means of attack and destruction**. It is not the same as the ultimate aspirations of the Islamist leaders, which hardly differ from those of all aggressive political leaders, from pharaohs to modern dictators. Hundreds of people—and thousands waiting in line—blow themselves up to welcome a few leaders to power, wealth, and fame (or a futile dream of it) with a carpet runner strewn with pieces of scorched human flesh instead of rose petals.

Why is Islamism successful? There are three peculiar reasons against the generic pattern of totalitarian drive.

1. Islamism is based on a book which could be found in any family for over thousand years and is part of life: a sacred and beloved book. The code requires a weekly lecture on a theorism coming from the cleric interpreter. The strength of the mass acceptance and the influence of the code designed to regulate all aspects of life, including sacrifice and reward, gives the legitimacy to the lecturer. Neither the Nazi, nor the Communists had such books. They printed their own Big Books: *Mein Kampf* and *Short History of the Bolshevik Party*. None of them contained the "sanctification of death" (Bernard Lewis) typical for Islam, although, of course, cult of death was practiced.

2. The internal terrorism of the tribal society hampers its evolution. Islamism revolts against all forms of change: those coming from secular leaders and those coming from

the West. Murder is the cheapest way to put breaks on history. You can kill with bare hands.

3. The new technology of instant and undeterred by distance communication provides unprecedented means to turn population into a beehive.

All that leads me to a very unpleasant question. Do the three waves of totalitarianism–Communism, Nazism, and Islamism–mean that the postmodern civilization of unlimited growth is coming to an end and the two hundred years of Industrial Revolution have been just a transition state to a new state of stability on new, yet unclear terms, probably, an Old Deal? Does it mean that the end of history is still behind the corner? Or that we have completed the run around the square block?

A whole peacock tail of other questions accompanies this question.



But my time and space is over.

AFTERTHOUGHT

There is abundant and diverse literature on Islamic terrorism, the main points of which can be easily found on the Web. Among the books, **Dying to Win: The Strategic Logic of Suicide Terrorism** (Random House, 2005) by Robert A. Pape is outstanding and I would trust him more than myself even if I disagreed. It is full of hard unexpected facts, striking revelations and it leaves disturbing questions, too. What struck me most was the relatively small number of suicide attack (315) between 1980 and 2003. I was also reading with awe the passionate and penetrating *From the Terrorists' Point of View: What they Experience and what they Come to Destroy* by Fathali M. Moghaddam, which is not reflected in this Essay. Bernard Lewis provides a historical perspective–as profound as it is artistic–in his books, for example, *The Crisis of Islam: Holy War and Unholy Terror*, The Modern Library, New York, 2003. He has a unique ability not only to draw parallels but to uncover contrasts and he speaks from the unambiguous moral position of individual freedom and not from abstract and toothless humanistic values.

Since I have recognized Islamic terrorism as a **personally** familiar variety of totalitarianism, I want to add two **personal** remarks based on my own experience of life in a totalitarian state.

First, I want to testify that, according to my observations, general population adapts to the totalitarian way of life by avoiding sacrifice by any means and pursuing rewards mostly in roundabout ways. Millions of Germans had to adapt twice: to the Nazis and to the Stasi. The decimated Russians adapted to the Party, too. The Muslims adapt to a wide range of conditions from Wahhabism to Turkish secularism. The Americans would adapt to an American theorism, too. Human nature always wins, but adaptation comes after a cruel selection. A strong state can keep a dissident alive in jail, but a week state or a tribe has no choice but to kill him.

Second, as somebody who could not adapt to the unnatural even for the totalitarian system state of suspense, uncertainty, and constant humiliation in the refusal of 1979-1987, I want to testify that my hate of the Soviet system and Russia itself during those years was, probably, not less than the hate of the West by a brainwashed Muslim. I did not blow myself or anybody up, but by protesting, organizing a small group of refuseniks, challenging (teasing is a better word) the KGB (secret police), and passing information about the refusal abroad I reacted to the humiliation in a way pretty close to suicidal, which means that I consciously played the Russian roulette. My 40 day long hunger strike in 1982 alone was a road to suicide, inspired by the Irish suicidal hunger strikes of 1981 , all the more suicidal that I did not know about taking salt. But the bullet came in the shape of a Siberian labor camp, where I was twice in touch with death, not intended, however, by the authorities. By that time the Soviet theorism was nearing the end of its evolution and became less bloodthirsty. But I already told about it in *Memoirs of 1984*. In America I pretty soon cooled down. On my current view of Russia see **Essay 44**.

In his early childhood recollections Leo Tolstoy described his older brother's conditions for a wish come true:

> These conditions were: first, to stand in a corner and not think of the polar bear.

Of course, it was impossible. But in America I was able to cool down, never completely reconciled with my past, by playing the same game. I had, however, to take really harsh steps by cutting bonds with many good and generous people who reminded me about the polar bear.

PART 4. RECAPITULATION

The following recapitulation is not a review of literature. It is an independent test of the chemical view of the world. I was pleased to find out that the opinions of professionals (#11, for example) significantly overlapped with my improvisation. Anyway, Favaz Gerges' book was an excellent stimulus. Robert Pape, Fathali M. Moghaddam, and

Bernard Lewis left only minor gaps in my understanding of Islamism but no sympathy to it, which often follows from understanding. All those books have been an extremely captivating reading.

1. The postmodern world is obsessed with a pattern of growth which I called elsewhere **numerization**. In short, only what has a numerical value has a value at all. While wealth, fame, and power—the three currents of numerization—are commonly creative, there is one kind of numerical growth that stands apart: the growth of stateless armies designed not to create, but to stop and to reverse history by piling up corpses.

2. Militant Islamism takes its place among the **totalitarian** theorisms of modernity and postmodernity.

3. It is the first such theorism that has a **conservative** and **protective** agenda, at least on the surface. I wish somebody could correct me on this point.

4. Islamism is a geopolitical movement. Its revanchist and annexionist streak reminds of Nazism.

5. It is the first such modern theorism that has no state platform. Before 1917 militant political Marxism had no state platform either.

6. It is based on tribal loyalty, but takes away the choice between its concentric circles. It destroys lives and families in the name of idea, which is typical for theorism.

7. It maintains internal terror by local and traditional means.

8. It is sustained by modern technology like any other major theorism of modernity. Actually, it has been widely recognized that the Islamic terrorism would be impossible without Internet and cell phones. Islamism uses a **privatized** technology of terror, unlike that of the Nazi and the Soviets who guarded the state monopoly. It looks like Iran aspires to have both.

9. It exploits serious mistakes and inherent weaknesses of its Western opponents and especially the fatal choices of American voters. That is also a technology-driven trend. The money-driven election showbiz leaves little good to choose.

10. To fight terrorism means to selectively strengthen or weaken key bonds in the initial, transitional, and final configurations of the conflict. The exact shape of this configuration is up to the professionals. But, as the generals understand and the peaceniks do not, it means to kill, i.e., eliminate the nodes of the network.

11. The following countermeasures are being widely recognized (compare with The Strategic Logic of Suicide Terrorism by Robert A. Pape):

- Weaken tribalism by offering an alternative of economic independence.

° Put emphasis on defense in the form of secure borders and counter-terrorism.

° Cut money supply. Don't pay for your funeral.

° Strengthen offense in the form of propaganda that reveals the internal contradictions of terrorist system and ideology. This is the only kind of information that can be checked by the object of propaganda.

° If military action becomes necessary, it should be executed without any restraint, shock-and-awe style, in order to raise the transition barrier to terrorism. There is no global government and we have to defend ourselves. Naturally, our own barrier to military action should be high enough.

° Engaging and compassionate dialog is always acceptable even with the most repulsive enemy. There is no reason to reject negotiations with anybody.

That the Great Satan can afford some magnanimity toward Smaller Satans is not widely recognized.

° Sometimes [Robert Pape emphasizes **sometimes**] concession and retreat can work. There is no reason for the American presence where it is not desired.

I am not sure this is widely recognized: we, Americans, have our own Big Book, although in a small package: The US Constitution. No other Big Book can unite us, although the Red Republican Revolutionaries have already tried. And somebody will try again.

But what is the **simple reason** of Islamic terrorism, to which I hinted in the Introduction?

Wherever wealth (= energy) is concentrated in few hands and tends to grow, a new socio-political species emerges and a new instability leads to a transition state. Here I mean the oil money, but the principle itself is the main thing the physics and chemistry of history tell us. This differs but not directly contradicts the theory of Robert Pape who considers the suicide terrorism an "extreme national liberation strategy" and presents impressive arguments, with which I do not agree. The sectarian suicide bombings in Iraq, however, clearly demonstrate the inherent fallibility of all theories regarding large scale human matters. Islamism wants redistribution of power (wealth would follow), and world domination as much as the Nazis and, especially, Communists did. Islamism is a configuration under the same pattern.

Suicide bomber, in my opinion, has become a standard issue weapon, "poor army's guided missile" (Fathali Moghaddam, p. 123), biped, though. Of course, only a totalitarian theorism can regard an individual a single-use disposable killing machine and

use it for political reasons. I am not sure even Koran has anything in it that directly, without a theorism, can give a blessing to a modern Muslim suicide bomber who kills other Muslims (Bernard Lewis confirms that). This entire murderous machine works only because the **internal Islamic terrorism** suppresses dissent the same way dissent was suppressed by Hitler and Stalin.

We, hedonists and sybarites, are terrified by the **suicidal** aspect of bombing which overshadows its pragmatic aspect: **killing**. For the generals and sergeants of terrorist armies the pragmatic aspect–bombing–is the only thing that matters. Robert Pape has collected lots of amazing evidence of Islamist pragmatism in his book and other authors add their own.

With a wider brush, regardless of totalitarian means, Islamism, in my opinion, is a **drive for power** concentrated in a few hands–the most universal, natural, and ideology-blind force of history, which drives us, Americans, too. Power, as I noticed in **Essay 44**, is measured by the available amount of wealth (=energy) to spend on a single goal. Whether the goal is liberation, caliphate, Herostratos' fame, victory over cancer, great fun, military victory, saving the earth, or even more power–this is secondary.

I hope to return to this point soon.

For detailed professional discussion of terrorism, see http://www.comw.org/tct/

NOTE (May 4, 2007). I had to wait for almost three months in line to get ***Infidel*** by **Ayaan Hirsi Ali** (New York, Free Press, 2007) in the local library–an unprecedented time for this kind of book. Meanwhile, I had an opportunity to watch Ayaan on TV at a book discussion. Her magnetic personality combined with her incomparable book, both in aura of an already extinct in the West kind of intellectual honesty, made a profound, even painful, like a wound, impression on me. She became another Spinoza, expelled from Holland as a troublemaker and heretic. Her book, as any great book, leaves some big questions unanswered, although one her verdict is unambiguous: Islam is not just a religion: it is a totalitarian ideology.

Ayaan Hirsi Ali provided me with a third testimony in a peculiar side line of her questioning. She noted, with surprise, that being Dutch did not mean anything for her younger Dutch friends: they were free of patriotism. Oriana Fallaci wrote about young Italians who were ashamed of the Italian flag (proudly displayed for years at a home in my own American neighborhood). My young Israeli friends, who emigrated to America, spoke with disdain about American patriotism, as if it was an obsolete line of clothing. This may be the most ominous sign of times: nothing but the bloodstained, burnt, and vilified American flag–and in bad hands–against the Green one.

The following **APPENDICES 1 to 3** belong more to complexity than to simplicity and are possible seeds of further investigation.

APPENDIX 1 . Transition state

Excerpt from:

Charles Jaffé, D. Farrelly, and T. Uzer, *Transition State Theory without Time-Reversal Symmetry: Chaotic Ionizationof the Hydrogen Atom*, Physical Review Letters, Vol. **84**, No. 4, 24 January, 2000. http://www.physics.gatech.edu/people/faculty/uzer/118.pdf

> Transition state theory (TST), introduced by Eyring and Polanyi [1,2] in 1931 as an early attempt to determine absolute reaction rates, is too often considered the domain of the chemist or chemical physicist. However, the transition state (TS) is actually a general property of dynamical systems which involve an evolution from "reactants" to "products." Such processes include, but are by no means limited to, the ionization of atoms, the dissociation or reaction of molecules, and even the escape of an asteroid from its orbit. Conventional TST [3,4] postulates the existence of a minimal set of states that all reactive trajectories must pass through and which are never encountered by any nonreactive trajectories. Thus, the TS is a hypersurface of no return. While, as noted, TST has been used mainly in chemical physics, it also offers considerable advantages in other problems, especially those whose dynamics are nonlinear or chaotic, that involve some form of progression from an initial to a final state.
>
> [1] H. Eyring and M. Polanyi, Z. Phys. Chem. B **12**, 279 (1931).
> [2] M. G. Evans and M. Polanyi, Trans. Faraday Soc. **31**, 875 (1935); also see papers and discussion in Trans. Faraday Soc. 34, 3—127 (1938). [3] P. Pechukas, *Dynamics of Molecular Collisions*, edited by W. H. Miller (Plenum, New York, 1976), Pt. B.
> [4] E. Pollak, *Theory of Chemical Reactions*, edited by M. Baer (CRC Press, Boca Raton, Florida, 1985).

APPENDIX 2. Chemistry and psychology

See a ppt presentation *Signed Social Relations* by Patric Doreian.
(http://mrvar.fdv.uni-lj.si/sola/info4/balance/pat/signedsocialrelations.ppt)

The quotation means, **in a simplified form**, that people in a small group are connected by bonds of different strength and sign (i.e., positive or negative, attraction or repulsion, cooperation or conflict), and the resulting configurations (**Figure 2**), very much like a chemical structure, undergo series of changes, moving through states of increased

stability ("balance"). Thus, **A** and **B**, members of a small group, are connected by a positive bond. They have common close neighbors **C** and **D**, with a sign attributed to each bond. Each atomic member, called generator in Pattern Theory, has a circle of close neighbors. The partially overlapping circles constitute the network (*configuration*).

The changes consist of changes in the strength and sign of the bonds, as well as in addition and elimination of the "atoms." Theories of balance, in the form of cognitive dissonance, apply also to individual acts, which can be represented as configurations with positive and negative bonds. Similarly, ideas, for example, plans, decisions, and evaluations, are networks with pro and contra arguments.

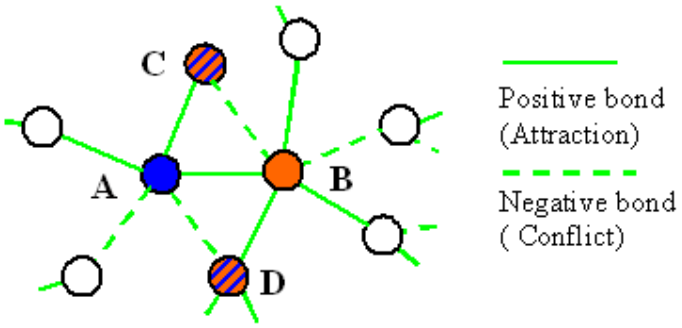


Figure 2. Fragment of a social network

In terms of Pattern Theory, both chemistry and psychology deal with configurations and patterns and so do all studies of complex systems, including history of societies and ideas. In this sense, all such studies, including biology and economics, are histories, or sequences (trajectories) of configurations (events). The sequences and configurations in X-systems include in principle unpredictable novelties (this is my interpretation of the principle of fallibility of George Soros), which distinguishes human matters from physical sciences. The traditional physics and physical chemistry study time-invariant properties. Organic chemistry as a whole straddles the border and this is why life started in chemical systems. Chemistry, therefore, is an introduction into complex systems.

Negative bonds are as legitimate in chemistry as positive bonds: they follow from the same quantum equations as the positive ones. They mean simply an impossibility of bonding. Evolving complex systems based on biochemistry have very much stable and vibrant negative bonds because they are maintained by constant dissipation of free energy supplied by an external source.

For more details about X-systems, see complexity.

> **NOTE** (2009): Henry Kissinger's **Diplomacy** is a study in the concept of power balance in international relations. It comes to conclusions strikingly similar to those of the balance theory in social psychology.

APPENDIX 3. Anatomy of history

As a preliminary illustration, any history (i.e., evolution) has a universal **quasi-fractal pattern** (hetero-fractal?) that can be compared with a string of beads made of strings of beads made of string of beads, etc., but with no two beads identical at any level. In **Figure 3** this non-repetitive heterogeneity is portrayed by different sets of symbols. A somewhat different view would see history as a continuous **fiber bundle** (the term is not

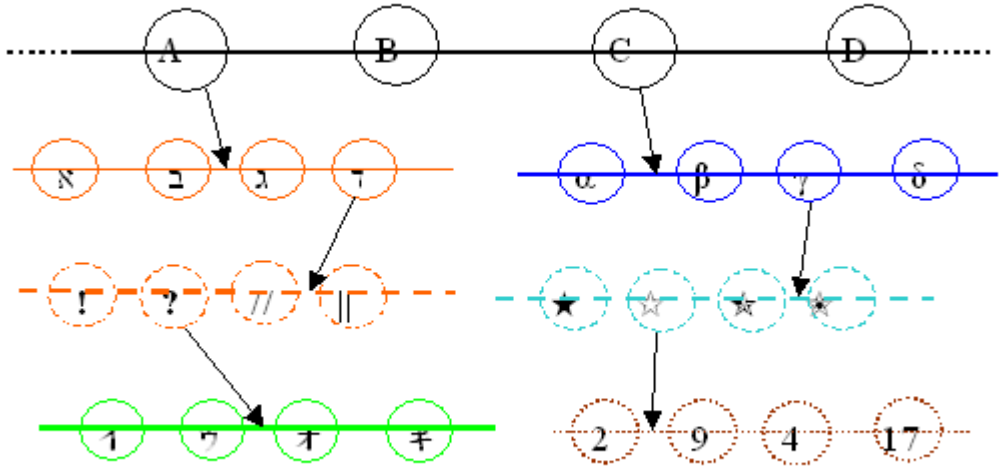


Figure 3. Quasi-fractal structure of history

meant to be related to fiber bundle in topology, but it may open a question), in which individual strands have, so to speak, variable thickness and may even emerge or disappear, see **Figure 4**. One way to deal with this object is to see it as an **anatomy**. The key question, to which Pattern Theory is the answer, is: how can we see any regularity in such heterogeneous picture. I hope to come back to this subject elsewhere. As a hint: anatomical **patterns** have been one of the areas of Ulf Grenander's research.

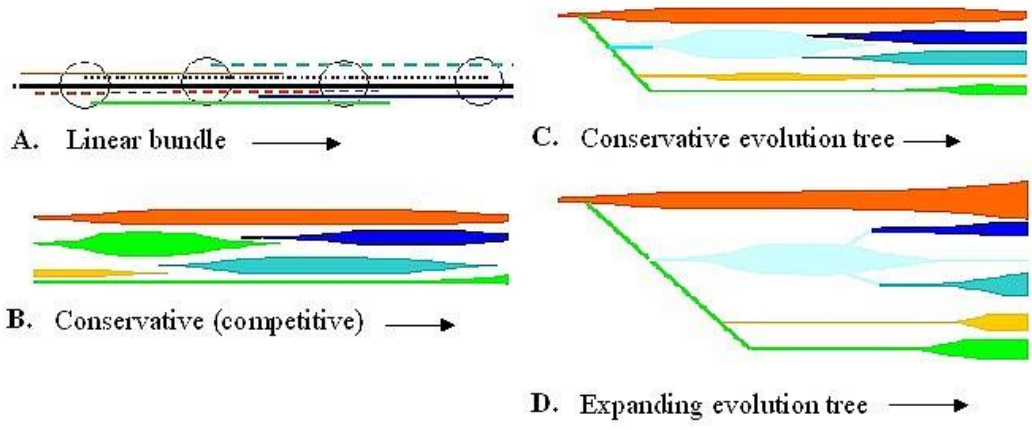


Figure 4. Evolutionary bundles

APPENDIX 4. The yardstick of orthodoxy

The following is an excerpt from my *Memoirs of 1984*, Chapter XIV. The Pyramid

The scope of that responsibility posed a problem. How could a person of very limited knowledge and capabilities know without any special training or education for this particular function what was right and wrong about a neighbor who had not violated either regulation or law?

Heresy could be detected only with the yardstick of orthodoxy.

Soviet orthodoxy was shaped as a quasi-religion with Marx as God the Spirit, Lenin as God the Father, the Party as collective God the Son, and the current party leader as the Czar. All four were infallible, the czar at least while he was still on the throne. That in the Russian Orthodox Church the czar was both a religious and civil leader, and his power was divine, was of telling significance regarding the Russian mentality. The four were one, and they were righteous and almighty. Only those who believed in them could enjoy life in the worker's paradise on earth. Those who were not true believers had to be corrected and reeducated. If they resisted, they should be destroyed or isolated.

It was an elaborate orthodoxy of human behavior that made it easy for partorgs to pinpoint heretics. Heretics were not just those who deviated from the orthodoxy of thinking. It would take some brains to find out whether there was a deviation or just a rewording of the orthodoxy. So, instead anybody whose behavior did not fit the approved model, whatever his motives were, was labeled a heretic.

Actually, the Soviet system of ideological control was nothing but a system of quality control at the end of an industrial assembly line. Any bolt that did not fit the standard dimensions went to scrap.

Unlike in Orwell's picture, it was not thoughts that were controlled, but only behavior, because the intellectual capacity of the party and police never exceeded the lowest common denominator.

The powerful process of artificial selection was at work in Russia because there was always a standard of behavior. It was like the standard of breed for a dog breeder. That is how the intricate function of ideological control could be performed by ignorant people—they were given a yardstick or, rather, the procrustean bed.

2007

Essay 50. The Mysterious Island

This Essay is about the longest single adventure of my life.

In October 1942, during WW2, I, my mother, and my father's family lived as refugees in the Ural Mountains on the border between Europe and Asia. My father was fighting the Germans near Stalingrad. My cousin Galya presented me with an awkwardly thick for a child illustrated book *The Mysterious Island* by Jules Verne. I was six and she was twice older. I had only recently learned to read, guided by pictures in an ABC book and occasional cues from my grandmother.

After the flight from the advancing Germans, the scattered by the war branches of my father's big family had gradually gathered together in the city of Chelyabinsk. Five women and myself lived in a single room, using suitcases and chairs to extend the sleeping space, which had to be assembled each night and taken apart in the morning. More relatives were packed in a couple of other rooms of the apartment which I never managed to explore to the end.

I opened the book.

- Мы поднимаемся?
- Нет! Напротив! Мы опускаемся!
- Хуже того, мистер Сайрес: мы падаем!
- Выбросить балласт!
- Последний мешок только что опорожнен!
- Поднимается ли шар?
- Нет!
- Я как будто слышу плеск волн!
- Корзиина – над водой!
- До моря не больше пятисот футов!

Which meant:

"Are we rising?"
"No! On the contrary! We are descending!"
"Worse than that, Mister Cyrus! We are falling!"
"For heaven's sake, throw out the ballast!"
"There. The last sack is overboard!"
"Does the balloon rise?"

> "No!"
> "I hear the clacking of waves!"
> "The sea is under the basket!"
> "It cannot be five hundred feet from us!"
> Then a powerful voice rent the air and these words resounded:
> "Overboard with everything heavy!... Everything! We are in God's hands"
>
> Such were the words which erupted in the sky above the vast watery desert of the Pacific about four o'clock in the evening of the 23rd of March 1865.

The book became a window on a world that had existed long before I was born, was much larger than our city, of which I saw very little, and our room, which I knew too well. Life was very different and full of mystery somewhere. America was the first foreign country I learned about from a book written by a French writer in Russia invaded by the Germans. With a hindsight, it prophesied some distant events of my life.

In a year or two we returned to Kharkov, my native city in the Ukraine, recently cleared from the Germans, half-ruined by bombardments, but with our neighborhood intact.

Since that first encounter I opened the book countless number of times, for many years reading it from the first page to the end or at random, skipping some boring descriptions, each time discovering something new, understanding more, and watching the big book shrink in my growing hands, the illustrations losing sharpness, and the pages falling out. The book stayed with me throughout my school and college years until I left for Siberia to start a new independent and married life as an assistant professor of chemistry at a technical university.

I know how the book died. Once, when I came to Kharkov, I saw pages of the book nailed to the wall in the toilet: the rolled paper for the same purpose was available in Moscow but never in the big city 400 miles south of it. Most of Russia did not know what it was.

Recently, while thinking over a new Essay—this time about terrorism—it occurred to me that my current hunt for simplicity in complexity, as well as my entire chemist's view of the world and possibly even my entire life, go back to *The Mysterious Island* . My life was put on a firm, however tortuous, track the very moment I was able to read the first lines of my first book after the ABC:

> - Мы поднимаемся?
> - Нет! Напротив! Мы опускаемся!
> - Хуже того, мистер Сайрес: мы падаем!

In February 2007 I decided to succumb to the pull of the past. I found a great Israeli web site Zvi Har'El's Jules Verne Collection, which returned me to my early childhood.

"Are we rising?"
"No! On the contrary! We are descending!"
"Worse than that, Mister Cyrus! We are falling!"

Comparing the ingrained in my memory Russian beginning with the French original and the English translations, I made a late discovery. "For heaven's sake, throw out the ballast!" was curtailed in Russian to "Throw out the ballast!" and "We are in God's hands!" disappeared from "Overboard with everything heavy!... Everything! We are in God's hands!"

The original French *Pour Dieu* and *et à la grâce de Dieu* were jettisoned by the Soviet censors of Jules Verne in 1930s to let the souls of Russian children fly unencumbered by the ballast of religion.

As anything in human matters, the art, craft, and politics of translation evolve, too. See **APPENDIX 1**.

This minor case of Russian literary terrorism was a good moment to return to my **Essay 49** on Islamic terrorism, but the Mysterious Island resumed its magnetic hold on me.

Like Ovid's *Metamorphoses*, *The Mysterious Island* is a book of transformations. From the natural soil, plants, animals, and minerals of a desert island, the little colony of people and pets made pottery, iron, steel, soap, glycerin, nitric and sulfuric acids, explosive nitroglycerine, hydraulic elevator, clothing, bread, maple sugar, draw-bridge, cart, glass, gun powder, boat, electric telegraph, and the battery to run it. The transformations were initiated and directed—catalyzed, as I would say now—by the mind of Cyrus Smith, an American engineer and "a scientist of the first rank." No wonder, some of his companions regarded him next after God himself and felt safe in his hands. After the island had been destroyed by a volcanic eruption, the small group was able to replicate their colony elsewhere for as long as Cyrus Smith was in possession of his encyclopedic knowledge.

The chemical processes seemed most mysterious and for a long time incomprehensible to me. I could easily understand the assembly and rearrangement of solid parts, as in making bridge, cart, and boat. It was all like moving furniture twice a day to make and unmake beds. The chemical and electrical changes, however, were driven by invisible forces. Still, electricity was based on movement and later in my school years I could make an electrical motor on my own. But chemistry lacked any visible displacement in space. This is why chemistry as the art and science of magic transformations imprinted me for the rest of my life. It had taken quite some time before I was able to understand the secret machinery of chemical reactions.

In 1950's chemistry was going through a radical transformation, largely unnoticed by general public. The chemical theory was developing right before my eyes. As everything coming from the West, in Russia it arrived 10 to 20 years late. As a postgraduate at Moscow Mendeleyev Chemical University I was lucky to witness the process. I enjoyed the gradual understanding of how chemistry pulled its rabbits out of the hat. Chemistry

used a mental microscope for tiny intervals of time and that could be used for anything beyond molecules.

After chemistry had taken its modern shape, the chemical paradigm solidified. This can be compared with the transformation of a person from child to young adult, which, of course, happens only once in lifetime.

Looking back, I begin to think that I owe to *The Mysterious Island* a few traits of my character which, like all good things in life, can be unsafe in big quantities: the pursuit of independence (the back side is loneliness) and the thirst for ultimate reasons (the back side is difficulty to adapt to reality). I was also terribly impatient, although it was not the fault of chemistry.

I got an idea that there was only one science of everything and the scientist was somebody who knows **everything**. I have a more realistic idea of science today, but I believe that **everything** itself is an object of understanding, if not of science. Chemistry, one of the most insulated, self-sufficient, dark to outsiders, specialized, and unpopular areas of knowledge, with a bad reputation for our health and environment, holds a map of all which is mysterious in human matters and not just illnesses, drugs, and pollution. When we speak about chemistry in love and politics, we mean mystery without explanation. Bad chemistry simply means that the machinery does not work. No rabbits. Good chemistry works miracles.

After the war my father worked as manager at a small industrial co-op that made rubber boots and toy balls. Once he brought home an introductory level book on chemical technology of plastics. It was the time when there were but a few of them. Celluloid, Galalith, and Bakelite were omnipresent. Galalith (i.e., milkstone), made of casein (protein component of milk) cured by formaldehyde was the first chemical product within my understanding. See nostalgic **APPENDIX 2.** The description of Bakelite, however, was accompanied by chemical formulas which I did not know what to make of.

Imprinted by *The Mysterious Island* in my early childhood, inspired by Cyrus Smith, I developed avid interests in many things, but at the age of 13, after I had seen a display of spectacular chemical reactions performed for my school class at a local university, my amazement was as firmly cured into an infatuation with chemistry as the cottage cheese into Galalith. My attraction to chemistry could be compared only with an affair with a *femme fatale*, for which I had been well under age, however.

I did not lose my interest in everything else, except history, to which I remained indifferent until mature age. I was especially attracted to anything that could be done with human hands. There was enough popular science and do-it-yourself literature in Russia to satisfy my interests.

Most of experimental science of that time had human dimensions. Experiment was within the limits of manual dexterity and observable with either the naked eye or optical instruments. Only psychiatry, which I studied rather deeply, could be compared with

chemistry as far as its mysterious obscurity was concerned. It was as far removed from manual intervention, however, as distant galaxies.

My high school and college interests included mathematical logic, cybernetics, physics, biology, physiology, medicine, psychology, psychiatry, polar expeditions, engineering, robots (or, rather, automata, known since the Middle Ages), utopian philosophy, folk tales of all nations, languages, literature, and music. With such wide and wild spread I could hardly reach through the surface, but I could fly over it.

We cannot see magnetic field, but can visualize it with iron filings. Unlike the tangible natural sciences, engineering, and human scale psychiatry, chemistry dealt with atoms and molecules believed to be forever invisible. Chemical reactions could run without any visible sign of a process—or with explosive intensity. To have control over such esoteric and alien properties of matter seemed to require diabolic power and supreme ingenuity.

The connection between a few trivial manipulations like mixing, stirring, or heating and the radical and complete transformation of properties seemed the most mysterious thing in all science. All physical and physiological processes, birth, life, and death, planetary and stellar events could be described in their continuity, as a sequence of stages best of all exemplified by a strip of movie frames. There was a gap between frames (actions) and their consequences in chemistry, quite unnaturally in the natural world. It is not only natural but required in detective stories—another distant parallel with movies. The parallel has been noticed, **see Essay 48, Motives and Opportunities**.

I started to build my own home laboratory. In those times chemical glassware and even chemicals could be freely and cheaply bought in two school supply stores. Soon our two-room apartment was filled up with stinky chemical fumes (my parents had immense patience with me) and I transferred my lab to our fourth floor balcony. I began to read chemical textbooks long before we had chemical class at school. I did rather complicated things, mostly in the faster and more eye- and nose-catching inorganic chemistry. And of course I was still reading *The Mysterious Island*, although on rare occasions. Since that time I have had uncountable opportunities to witness a revulsion to chemistry as science that most normal educated people in this world possess.

I have always loved circus, to which my father used to take me each time the new show came to the city. My favorite act was illusion. The spectacular chemical reactions could be compared only with the tricks of magicians.

Of course, chemical reactions, as I learned later, also could run slowly and smoothly, but any individual molecular act was a breach of continuity. It was like the instant transformation of the circus girl into the lion or, at least, like cutting her in half. Only because there were zillions of molecules in the test tube, the collective properties of the swarm had their continuous run.

It is the breach of continuity that attracts me now to history, which has been my dominant interest for over a decade. How does history pull off its tricks? Can we invent a new trick? Why does the chemistry of history fail? Can we nudge history or rein it in? Is there

anything new under the sun? What is **the new** anyway? Unlike a molecular breakup, we can see a revolution or a war in all details, but still have no idea of why it happened. A hundred historians can have hundred opinions about the reasons for WW1 and never come to a consensus.

After 1956 and the shocking discovery of the monstrous lies and cruelty of my native country, the "only truly free and just society in the world," as we were taught, I got interested in social and political matters, but my interest had nothing to feed on: the sources were either locked up in the libraries or heavily censored.

For quite a time my only clear window on the Russian past and its bearing on the Communist present was the *Complete Collected Works* of Alexander Herzen in 30 volumes, never designed for a wide public, with wonderful editorial notes full of references to other Russian pre-1917 books still available in libraries only by special permission. Herzen's *My Past and Thoughts* (*Byloe i dumy*) could compete with *The Mysterious Island* by the number of my returns to its pages.

> Today the name of Herzen can be heard in America and Europe thanks to the play *The Coast of Utopia* by Tom Stoppard. The nine hour long play (Herzen appears in its third part, Salvage), as I understand, gives the Western audience an opportunity to feel by their bottoms the centuries of oppressive waiting for the better future by Russian intellectuals. Some of the brave theatre-lovers were as farsighted as to wear a special anti-bacterial underwear. (*The New Yorker*, March 12, 2007).

The long-awaited final curtain fall had come for the Russians around 1991. Soon it became clear that nothing would be final in Russian history. But I was already out of Russia.

In the 1960's and 70's, my constantly growing aversion to the Soviet system turned into hate and a premonition of my clash with the system.

That premonition clearly imprinted some of my Russian poetry.

More important, emotions aside, thinking about the fate of societies and the reasons for the transition of Russia to Communism, the stability of the Soviet system, its collapse, and its possible fate, I began to see history in its chemical projection: as a sequence of alternating stable and transient states, with each new state looking as a kind of molecule consisting of standard atomic blocks bonded in a particular way. Already on my way out of Russia, I managed to publish two frivolous essays in a progressive Russian magazine *Chemistry and Life* about temperature and transition state of social transformation.

The term **system** meant for me something different of what it meant for a physicist, as I had an opportunity to notice during my endless discussions with a new refusenik friend, theoretical physicist Eugene Chudnovsky. Two of us were brought together on the desert island of refusal when we applied for exit visas in 1979. Both unemployed, we had all time in the world to think and talk.

At this point I wish to reflect on the phenomenon of **refusal**. Thinking about Tom Stoppard's play, which I had not read (I read reviews), I realized that the Russian intellectuals were the first to experience a kind of chronic refusal—as an obstacle not to emigrate, but to **join** Europe as a nation. Moreover, I see now refusal as a historic **pattern**. More about it in **APPENDIX 3.**

For a typical physicist, as I see it, system means something that has **measurable** properties as a whole and within its various areas.

Chemistry is a realm of individual objects that differ not by properties expressed in numbers, but by their structures. It is a realm of individuality and when I imagine myself a physicist, I cannot find anything individual in the universe but the universe itself—not so for an astronomer, of course. Nothing expresses the difference between physical and chemical views of the world better that physical and chemical equations. Chemical space is not metrical but topological.

Dynamic systems change while static ones do not. The evolving complex systems—society, culture, economy, ecosystem—change on two time scales. Small local events happen every day and even every second, many of them reversible. Large scale global events are irreversible, rare, prolonged, slow, and usually going through a sequence of periods of long stability and short spikes of instability. Individual human life is a fascinating example, studied along and across not by scientists but by writers. Human history is another one such object. Both are inherently contentious.

Such systems, which physics has been trying for over sixty years to describe in mathematical form—and in vain—all have something in common: they exist by consuming **energy** capable of performing work and dissipating energy in the form **less** capable of performing work. Moreover, all such systems need **matter** made of atoms of the Periodic System in specific structured forms.

The evolving complex systems also eject the matter in much less concentrated and less specific form of dirty water, garbage, rust, debris, and filth. Pure matter can be recovered from filth, but only at the expense of more energy.

At the global price of dissipation and dispersion, the systems of individuals, societies, living species, product species, cultures, institutions, enterprises, technologies, science, language, art, theater—grow, evolve, decline, and die.

The processes in **exystems**, as I now prefer to call them (**X-system** was my first choice, still as good, but not enough *googlegenic*) are observable and very often, although not always, measurable. Our understanding of such processes regardless of what they are—life or technology or culture—is exactly my main interest.

No wonder I feel lonely on my own desert island, but I am not exactly alone there and not even the first.

When I discovered it in 1980, the island had already been named, frequented, and made habitable by Ulf Grenander, the author of Pattern Theory, which I see as the universal chemistry of everything. But I have already told about that many times on many occasions (in *Memoirs of 1984*, and *The New and the Different*, for example). What I has not told is that Ulf Grenander played the same role in my life as Captain Nemo in the life of the colonists on the mysterious Lincoln Island, in Russia but even more so in my American life.

The quest for a unified picture of the world has never stopped since the times of Aristotle and his Greek predecessors. There is a big literature on the subject.

I believe (but not insist) that I am the first to notice that the scientific picture of the world ignores an essential component: **novelty**. What is new? What is different? How can we scientifically study exystems if by definition they are supposed to amaze us with the magic of incomprehensible novelty? The answer is, of course, that science evolves with each such discovery. But evolution of complex systems and human history in particular is nothing but a sequence of **singular and never experimentally reproducible** surprises, otherwise one hundred historians could not have more than two or three opinions, mostly one. We could not be bogged down in Iraq with a *Theory of Iraq War*. What kind of science can confess of inherent inability to explain *post factum*, let alone predict anything of importance?

My main personal discovery was to notice in Pattern Theory a kind of mathematics that **expands the limits of understanding** of exystems because **it is open to novelty**. Of course, Ulf Grenander was the first to think about patterns of history in general, as well as specific, terms. His first suggestion was, characteristically, to explore the war between Russia and Sweden in the eighteenth century.

The rest can be found in **complexity** and simplicity . I do not expect future pattern exystemologists to calculate anything, get grants from the Department of Defense, and make money and/or tenure out of all that. **I do not even know what to expect.** Exystemology, which today is neither anything existing, nor anything systematic, is all **about the unexpected**. It is about how things happen, but not what will happen tomorrow, on which stock to bet, and for which candidate to vote. It is an adventure, like the escape of the five Americans from the besieged Confederate Richmond on the 20th of March 1865. With Cyrus Smith you don't know what lies ahead, but you feel more secure.

It has been my longest personal adventure.

The two remaining stories I would like to tell are about what theory means in Pattern Theory's approach to history—of course, not a patented way to explain or predict history—and how the fictional story written by Jules Verne 130 years ago represents and reflects properties of exystems—but one can just read his book, very much different from his other books. Probably, some other time.

APPENDIX 1. Translation: a shade cast by history onto a book page

Many years later I was able to compare *I am a Mathematician* by Norbert Wiener with its Russian "abridged" translation. Anything but flattery regarding Soviet Russia was thrown out, sometimes whole pages.

Nevertheless, I found two occurrences of God in the Russian text of *The Mysterious Island* . Those were standard everyday expressions. *God* occurs 30 times in the later English translation by Sidney Kravitz. In the original French text, *Dieu* occurs 34 times. *Dieu* and *le ciel* are used intermittently in the French original. In the earliest English translation I found 27 *God* and 15 *Heaven*. But no *Heaven* in the Russian one.

This is the beginning of the English translation by W. H. G. Kingston (1875):

> "Are we rising again?"
> "No. On the contrary."
> "Are we descending?"
> "Worse than that, captain! we are falling!"
> "For Heaven's sake heave out the ballast!"
> "There! the last sack is empty!"
> "Does the balloon rise?"
> "No!"
> "I hear a noise like the dashing of waves. The sea is below the car! It cannot be more than 500 feet from us!"
> "Overboard with every weight! . . . everything!"
> Such were the loud and startling words which resounded through the air, above the vast watery desert of the Pacific, about four o'clock in the evening of the 23rd of March, 1865.

Source: Jules Verne Virtual Library

This tells something about the freedom and necessity in the frivolous art of translation.



APPENDIX 2. Galalith

Galalith is well remembered in America and Europe. The Art Deco pieces of jewelry made of milk can be bought in Paris and Berlin for couple hundred dollars. See also this.

" This impressive German necklace is made of chrome metal, orange galalith parts, and large black galalith center elements which are screwed onto the chrome pieces. The condition is excellent. $230.
Why it's hot: This antique shop specializes in Art deco furniture, china, lamps and other home objects, but also in Bakelite and Galalit jeweler, from the 20th century. They sell:

Antiques as well as Bakelite jewelry (material developed in 1907-09) galalit which has a Retro appeal and has made the objects collectables in recent years"
Source: http://iwanttogotoparis.blogspot.com/2006_11_01_archive.html

APPENDIX 3. THE REFUSAL

The phenomenon of Russian refusal is quickly fading from public memory. Some memoirs of its victims could be found at the site Remember and Save. Google points to other sites and books.

Refusal was a sudden mass denial of exit visas, without any warning, to thousands of Soviet Jews who had applied for them after years of practically free, although never officially approved, Jewish emigration. The refusal lasted from 1979 to 1987. See also the end of Part 3 of **Essay 49**.

How to explain the pattern of refusal? Two analogies come to mind.

One is the situation described in the story *The Highway of the South* (La autopista del sur) by Julio Cortázar (one of my favorite authors). The Sunday evening traffic on the Southern highway to Paris slows down and stops. Nobody knows any reason for that. The people stuck on the highway start a new way of life in waiting, day after day, and, probably, week after week. The new life goes on with all its usual collisions and people adapt to it. They manage to get food, water, and sleep. They make love. They die. One day, the movement resumes as unexpectedly as it stopped.

The other is the current (2007) situation with illegal aliens in America. For decades the government used to close its eyes on the invasion of illegal aliens. Amnesty was the only response. Suddenly, in March, 2007, without any warning or change in legislation, in Fall River, MA, the raids against illegal aliens, mostly women, were unleashed. The children back from school could not find their mothers. Some scenes on TV looked staged for a Holocaust movie.

The Soviet refusal of 1979-1987 can be understood as the inversion of the Fall River refusal: in Russia thousands of people turned overnight not into illegal aliens but into **illegal citizens**. The exodus of Jews from Russia was suddenly **noticed**. They got frozen with one leg already over the border. Stopped in their tracks, most refuseniks, i.e., the applicants denied visas, who had already sold their furniture, quit jobs, and start packing the suitcases, lost **de facto** their however limited civil rights. As soon as you understand this, you can flip the picture and understand the problem of illegal aliens. They were first allowed, pretended to be invisible, and then suddenly **noticed**. This mental manipulation can help understand what pattern actually means in human matters.

> **NOTE.** The very concept of pattern has its roots in a peculiar abstract area of mathematics called **group theory** (or theory of groups of transformations) which

> deals with the chunk of reality spanning from quantum mechanics to Irish jokes and ways to wear underwear, whether antibacterial or not.

All that we, **illegal citizens** of Russia wanted was **to be deported**.

The majority, most of them well educated, had to wait for **eight years** on the Soviet highway to Communism and find some source of income. They adapted. Dozens of refusenik activists, who insisted on their never officially canceled right to leave Russia, appealed to the West, were arrested and sent to exile or labor camps.

For a story of my own **American** refusal of a different kind, see Personal Note **in Essay 44, Remembering Russia.**

I do not sympathize with anything illegal, including immigration. But on one of these frozen March nights, by strange coincidence, I was listening to the Open Source (Public Radio) program on Hanna Arendt, my other belated intellectual *femme fatale*. She castigated **bigness**.

America is big, Soviet Russia was big. Big is bad because it makes you small. Lincoln Island was small. The colonists were big.

The *bigness* is both blessing and curse. A born pessimist, I am—very atypically—see it as a blessing, as far as America is concerned. But I begin to have my doubts and fears. America, the blessed big brave cool melting pot, itself is now a big, but not the biggest, chunk in the hot global melting pot of a quite different chemistry.

2007

Exystemologists of the world, unite!

NOTE (2016). *The Mysterious Island* begins with an imaginary episode of the American Civil War. It is yet another opportunity for me to return to my fixation on the Cold Civil War in America. It is a point in American history from which a possible future looks like either blessing or curse, depending on whether you close your left or right eye, but what corresponds to which—it evades me. If America loses bigness, even with both my eyes closed, I see that there is no way democracy can survive in the world. But throughout entire human history, bigness always ended with a split.

Essay 51. Potato as Food for Thought

HOW EVERYTHING EMERGES AND WHAT HAPPENS AFTERWARDS



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WHAT IS EVERYTHING

How everything emerges and what happens afterwards?

Today I feel closer to answering this question than almost 30 years ago when I began to think about it seriously. The question itself seems to have lost its arrogance.

My short answer is: evolving complex systems (life, mind, society, language, culture, science, technology, economy, etc.) emerge from extremely simple structures (configurations) that can be crudely represented as points (generators) connected with lines (bond couples) in certain order. Configurations are the skeletons of everything commensurable with human experience. Whatever can happen to such structures amounts to either breakup or formation of bond couples. Systems containing such structures can be more or less stable, depending on the stability (strength) of their bond couples. The terms configuration, generator, and bond couple are the fundamental concepts of Pattern Theory (Ulf Grenander) .

Unstable evolving complex systems can exist if they are supplied with energy, dissipate part of it as heat, and retain the difference to maintain the unstable **labile** order. I call them **exystems**. (from X-systems; X stands for ECS: Evolving Complex Systems). Sooner or later they die anyway, i.e., lose their instability, altogether or in parts, but the spread between sooner and later can be very large.

Biochemical systems are, **probably**, at the lowest level of evolving complex systems. They satisfy the description in the previous two paragraphs. Social structures, languages, cultural institutions are examples of the upper middle levels.

Most probably, life emerges in unstable labile chemical systems through gradual, step by step, growth of complexity. At the dawn of life, periodic processes (fluctuations of temperature and light, tides, seasons, and natural catastrophes) had kept the initial simple systems unstable, preventing equilibrium, until they found the way to use solar radiation to do that on their own. This is possible exactly because life originates in **simple** systems capable of growth and complexification. Search in small systems is more efficient than in large ones. An exystem **must be small to emerge spontaneously**.

For the physicists who thought about emergence of life, the complexity of living structures was a mystery because the probability of the self-assembly of life **as we know it** was, unquestionably, zero. There is nothing mysterious for a chemist in a gradual stepwise increase of complexity, however. The mechanism of energy utilization for maintaining a chemical system in an unstable state is also well known. It is a very simple chemical trick used by all life forms.

Remarkably, we can observe the process of emergence in all detail while studying history of human institutions. All Columbus needed to discover America was money. All nature needed to discover life was molecules of ATP (adenosine triphosphate), the "pocket change of living cells" coming from the $1000 bills of food molecules (John Balmier). Plants make it from the little grains of gold—photons of light—with which the Sun showers the Earth.



Alchemy symbol for phosphorus, "light bearer"

The unstable systems search for stability, i.e. move toward a steady state (minimum of entropy production). The search means breaking up some bond couples and locking others. This can be achieved by **growth**: making more new bonds between atoms than losing old ones. While still unstable, **larger systems are more stable** because the changes are mostly local and do not destroy the entire large system. The unstable systems can grow, modify, and repair themselves. Stable configurations tend to remain in their stable state without change or are destroyed by strong impacts. Growth, therefore, may increase stability.

What are the upper limits to growth is an open question since the Club of Rome first asked it in Limits to Growth (1972), but they certainly exist.

Life exists in a narrow interval of instability (edge of chaos, as some say). It is unstable enough to change, grow, and move, but stable enough to have a genetic blueprint of itself.

After life emerges in **chemical** systems and enters evolution, it leads to all evolving complex systems we know and to new and yet unknown ones. This is why **chemistry** and its abstract generalization in the form of Pattern Theory (Ulf Grenander) are essential for understanding how everything emerges and what happens afterwards.

It is impossible to **know** EVERYTHING, but the basic concepts of chemistry and Pattern Theory open a way to **understanding** it as a whole. In the understanding of human matters **pattern** is the counterpart of a mathematical formula in the movement of planets, atoms, and subatomic particles. We probably understand the world because we think in patterns.

My short answer is long enough, but its explanation could be much longer. The evolving collection of essays at complexity and simplicity is only a low evolutionary form of an exploration of this confusing subject. EVERYTHING is still waiting for a young enthusiast who would pursue fun and glory in the sky with more zeal than tenure and beach house on earth. Nevertheless, in this Essay I am trying to give if not the shortest than the next to the shortest presentation of the entire topic. In order to do that I start with a tiny speck of EVERYTHING: a couple of unordinary books.

FOUR THOUGHTS ABOUT FOOD

In his two latest books Michael Pollan has presented to a wide audience a cornucopia of interesting ideas and observations, among them four ideas of general significance.

BOOK 1: *The Botany of Desire: A Plant's-Eye View of the World* (Random House, 2001)

IDEA 1 : Plants use humans as much as humans use plants

Thus, as much as the gardener manipulates a plant, trying to enhance its desired qualities, the plant (potato, apple) manipulates the gardener to solicit his care.

This idea immediately attracted attention of readers because of its dog-bites-man appeal. The typical plant is an epitome of immobility and passivity. Moreover, the typical plants have no eyes and, most probably, no senses.

The book with the catchy title, masterfully composed and exquisitely written, did not disappoint the readers. I had made a note of the author's name and was looking forward to Pollan's next book. It did not disappoint me, either.

BOOK 2: *The Omnivore's Dilemma: A Natural History of Four Meals* (The Penguin Press, 2006),

The second book seems even richer than the first. Three of author's ideas, although less flashy than **IDEA 1,** attracted my attention. My interpretation, however, may not necessarily coincide with the author's intent.

IDEA 2: The growing supply of energy increases complexity of its consumption

The growing surplus of corn production in the USA resulted in the emergence of new industries. Among them, production of whiskey and industrial farming of animals. While these facts are well known, Michel Pollan treats them as a pattern of a very general nature. In my interpretation, a **quantitative** growth of production of a single plant results in increasing **variety** of other products that count as energy source for animals, humans, and their machines. The non-trivial aspect of this obvious fact is the emergence of the hard to define **complexity**, for which we do not have a single measure. It arises from the growth of a single measurable physical value: **weight** of produced corn.

IDEA 3: The growing complexity of supply creates instability and uncertainty of demand

Along with the growing complexity of industries and their products, a counteractive trend emerges. A great complexity of food supply overwhelms the consumer and creates choice bottlenecks, through which food industry in developed countries pushes its enormous

variety down the consumer's throat. A new type of complexity, very much reminiscent of **weather**, emerges: waves of food fads, i.e., alternating approbation and disapproval of various products, in a rather chaotic manner. A whole new business of food fashion and anti-fashion emerges to steer the traffic of food to and from the shelves and toward the affluent eater's table.

The business of advertisement and counseling is typical for the affluent society overwhelmed with complexity of choice. This happens with all consumer goods.

The "omnivore's dilemma," or anxiety of abundance, is also a pattern. We can see it in the entire area of consumption: with gadgets as well as information. We see it also in food for thought and soul.

I simplify my life with *Consumer Reports* with all their shortcomings. The giant of Google has grown right before my eyes, fatting its calves on the endless prairies of information and it is now looking for companies to munch, too. The area of information is in the constant flux: the newspapers **as we know them** are the next to go. The countless blogs would require several lives to read them all, but with little nutrition.

IDEA 4: All food comes from the sun

Sunlight, exchanged for the coins of ATP, brings the grass from the soil, the cattle feed on grass, the chickens pick up grass, seeds, and insects, the food digested by the animals and birds fertilizes the soil, and humans feed on animals and plants.

This highly consequential idea is by no means original, but Michael Pollan illustrated it in a fine way by his description of truly organic farming that utilizes maximum of solar energy.

A chemist immediately notices that minerals (for example, compounds of potassium and phosphorus, probably, also of nitrogen) are missing from this picture. They are carried off the soil with food and must be replenished. In order to launch a close to perfect cycle of matter, all plants, animals, and humans should live and die on the farm.

WHAT IS DESIRE

This is how Michael Pollan remembers the moment when **IDEA 1** emerged in his mind:

> I realized that the bumble bee and I had a lot in common.

The bumble bee feeds on the plant and pollinates it. The author interacts with the plant in the role of a gardener who feeds on the plant and modifies it to his tastes. As the

insect and the plant form a single **system** of mutual dependence, so do the gardener and the plant. In the language of abstract systems, the bee and the plant are interacting **components of a system** as much as the gardener and the plant are components of another system, overlapping with the first over the plant. All three are components of a larger system.

Having emphasized the reciprocal relations between the gardener and the plant, Michael Pollan seems to hold back.

> When I talk about these plants cleverly manipulating us, I'm obviously using figurative language. We dont have a very good vocabulary for talking about how other species act on us,about their agency. We see the world as if were the thinking subject, and then youve got that subjects object. And so, you know, I pull the weeds, I plant the potatoes, I harvest the crops. But this is just a limitation of our language (source).

I part here with Michael Pollan's brilliant books that uniquely convey the amazement the old naturalists felt for the wonders of nature. I **use** his four ideas as an introduction into my next attempt to explain (first of all, to myself) how everything emerges and what happens afterwards. The second part is the easiest to answer: history. The first part, however, is more intricate: out of simplicity.

If so, there is a chance to find a "good vocabulary" and language without limitations, at least, give it a try. And, by the way, aren't we in fact both thinking subjects and thinking objects?

We say that the gardener **desires** certain properties of the plant. Why cannot we say that **the bee desires** certain properties of the plant and the plant desires certain properties of the gardener?

The anthropomorphic terms **desire, goal, purpose**, **love, hate, fear, joy, anxiety, despair, satisfaction, manipulation, use, domination, submission, will, hope,** etc. relate to humans and systems of humans. Are they the artifacts of the language or signs for something applicable beyond human matters?

We have been endlessly arguing about similar questions since the appearance of modern robots and computers, i.e. for more than half a century. Do they or do they not? Can they or cannot? We certainly attribute memory to them, and even acknowledge that it is better than our own. But, unlike the blueprints of exystems, it cannot mutate. In this sense, computer is not alive. In this sense bureaucracy is dead.

What about desire? For the last twenty years, on a growing number of occasions I have had fleeting feelings that my computer, and especially my current Dell computer with Windows XP, has a **desire** to infuriate me with its unpredictable and unexplainable behavior. I punished it by turning off its energy supply and rebooting, which seemed to

work, although not always. I begin to think that the only reason behind that was the desire of Microsoft to push another operating system down my wallet, but the next moment I suddenly realize that there is no proof that Microsoft is human and can desire. It is a corporation with **humans as one kind of components**: a system as much driven by economic hunger and prone to entropic decay as a human body driven by hunger and subject to aging and death. It uses me by making me use its products. My computer uses me, too, with the purpose of propagating the species *Fenestrae micromollae* .

WHAT IS HISTORY

Weather (which I linked to Pollan's **IDEA 3**) has often been used by scientists as an epitome of complexity within the framework of ordered chaos. A whole wave of books and articles on chaos and complexity arose and subsided between the late 1980s and 90s. Practically each of them mentioned a butterfly in Hong Kong creating a hurricane over Florida, with some geographic variations.

I find no use for the butterfly, but the phenomenon of weather may help us understand the phenomenon of history. I prefer history to a more ambiguous term: evolution. The latter is used in natural sciences to denote any gradual process going through a series of identifiable steps. It applies also to a particular case of origin and evolution of life, society, or paper clip. The term has a whole spectrum of meanings. On the contrary, history is usually understood as history of humankind from cave people to kings and slaves and further to the demise of the kings and the redemption of the slaves. Human history includes the histories of all man-made things, ideas, and institutions, as well as the history of the entire Earth under the impact of humans.

> The view of planet Earth as a single system in which everything is connected was passionately expressed by Russian geochemist Vladimir Ivanovich Vernadsky (Владимир Иванович Вернадский, 1863-1945). Vernadsky, who remains well remembered and esteemed in America, and kind of cult figure in Russia, regarded Earth as result of three waves of evolution that started at different times but have been running concurrently since: geosphere (minerals and fluids) , biosphere (life), and noosphere (human matters). The latter is the stage at which humans begin to change the entire planet by means of rational activity (which our posterity may deem irrational). But this subject deserves a separate and closer look.

By history I mean not a particular history of something but a **fundamental property of exystem**s.

The author of the hyperbolic metaphor known as butterfly effect was meteorologist Edward Lorenz. He first introduced it as a butterfly in Brazil causing a tornado in Texas. Some suggested he responded to somebodys image of seagull wing causing the change of world weather. A link was also drawn to Ray Bradburys story *A Sound of Thunder* (1952) about the traveler to the past who stamps a butterfly and back in his time finds history changed.

In *The Butterfly and the Tank* (1938) by Ernest Hemingway, about deadly consequences of a prank, human life is a fragile butterfly under the tank of war, quite like a mobile home under the tornado.

The **history** of the butterfly effect **itself is an example of emergence** and subsequent evolution of a small component of human culture. Geographic variations play the role of mutations. The butterfly effect, in terms of Pattern Theory (see next section), is a pattern of "large consequences from small causes" and the variations are regular configurations embraced by the pattern.

A butterfly may or may not cause a tornado. But the original story of Ray Bradbury, itself with roots in H. G. Wells *The Time Machine*, which I trace far back to the Sumerian cuneiform dream books, seems to imply a more rigid chain of cause and effect. Therefore, somewhere in the history of this metaphor a more significant **mutation** occurred.

The weather in the little State of Rhode Island today has no direct relation to the weather a year or a century ago. Even though an exact prediction is not possible, the prognosis partially depends on the weather yesterday and even more on the weather an hour ago. It also depends on the weather within 200 miles west, north, and south of Rhode Island and is still sensitive to what happens at 2000 miles in those directions. The rain comes from the West, hurricanes from the South, and the freezing cold from the North. Hardly anything comes from the East

The weather today also depends on climate and the climate has a history. The history of climate may include one time catastrophic events, like volcanic eruptions. Climate also has unique long range events, such as the emergence of oxygen in the atmosphere, attributed to the growth of algae and plants, last ice age, and something we do not even know.

History happens on a different scale as compared with weather. It is unique and irreversible. Thus, the shrinking of the ozone layer and its subsequent partial restoration as result of the ban on chlorofluorocarbons around 1990 was a short time unique event. It has confirmed the idea of Vernadsky that any history on earth is ultimately global.

I would use a metaphor of a ballroom dance competition (only because it impresses me more than any sport except soccer) to illustrate the difference between the weather and the climate or everyday human life and human history. We could also look at a dog show,

but dance has a pronounced two-dimensionality, which the dog show has only to a limited degree.

If the weather can be compared with a dance on a floor, in which the movement patterns may repeat and the exact positions do not, history is the entire sequence of performances that can happen only once in the competition and never repeat again. The difference is that the program of the competition is known in advance, while history is not (unless you believe King Solomon). Nevertheless, everyday life, i.e. the weather of our existence, can be predicted in many instances for a long time ahead. As far as a competition with elimination is concerned, although the program is known, the exact sequence of events that will go to the annals of ballroom dancing is unpredictable.

Another detail will add more to the comparison: this year ballroom competition has only a limited bearing on the next year results. In human history what happened four or fourteen hundred years ago may have more influence on tomorrow than what happened yesterday.

I believe that in human matters the best way toward understanding how everything emerges and what happens afterwards is to avoid definitions and use illustrations. The reason for that is the property of history which I call novelty. As soon as we invent the typewriter and learn to use it, the computer comes and knocks the typewriter off into the dustbin of history. As soon as we invent a floppy disc to store what we type, flash memory without moving parts comes and we fill up the garbage dumps with floppy disks. The dazzling, extravagant, or elegant French kings, ruthless Chinese emperors, and solemn Russian czars leave the global stage now populated by their theatrical and cinematographic shadows. The crowd on the global stage pushes aside the mighty America through economic and political novelties the significance and consequences of which are fiercely disputed, while even climate and weather stir up a global controversy. This is history and it happens only once, unlike a movie that we can rewind or run fast forward

One might note that science also moves ahead through changes in theories and paradigms, but this exactly what it means to have history. Science has its history. History does not have its science.

The problem with human matters is that history knows no reproducible experiments. Theoretical science, in spite of the initial enthusiasm around the systems theory, can tell us very little about the fate of humans on our planet. True, this little is extremely important, but it was said by physicists.

In order to exist, life on earth, society, economy, and even culture (just look at what is happening to the struggling Public Radio and classical music in America) need a source of energy in the currency of money. The main long term source of energy for evolving complex systems on earth is the sun. The mineral or nuclear fuel is a temporary source not just because its resources are limited (the limits are, strictly speaking, not known) but

because the products of its burning or fission put limits on the growth of energy consumption.

This is an inverse omnivores dilemma: how to get the one and only resource—money—for an overwhelming variety of desire. This is the problem of omnispender.

WHAT IS POTATO

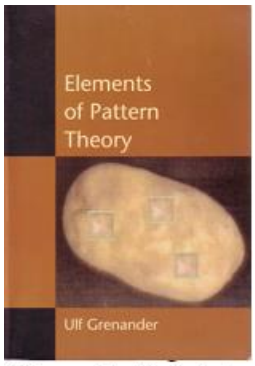


Figure 1. Potato!

Potato, *Solanum tuberosum* , a plant with delicate fragrant flowers, is one of the heroes of Michael Pollan's *Botany of Desire*.

> So the question arose in my mind that day: Did I choose to plant these potatoes, or did the potato make me do it? In fact, both statements are true. I can remember the exact moment that spud seduced me, showing off its knobby charms in the pages of a seed catalog (page *xv*).

It is also one of the characters in Pattern Theory.

The cover of Ulf Grenander's *Elements of Pattern Theory* (Johns Hopkins Univ. Press, Baltimore, 1996) displays a potato (**Figure 1**). The small squares on its surface are areas selected for the analysis of color.

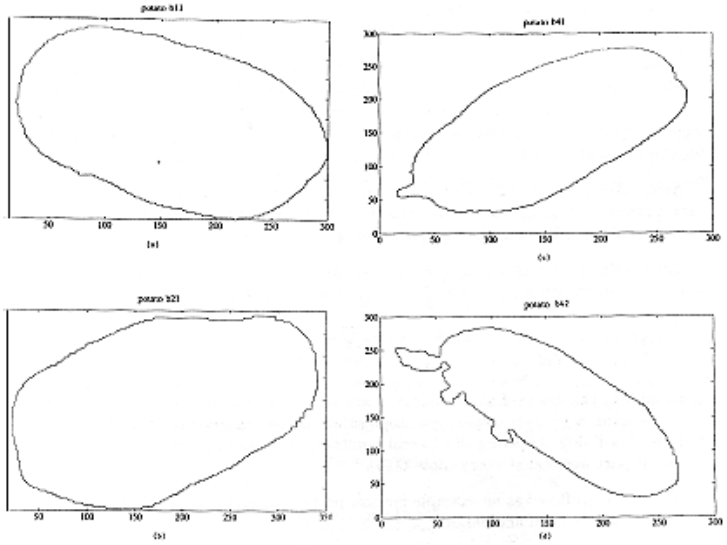


Figure 2. Potato shapes .
From: *Elements of pattern theory* , p 139

Figure 2, borrowed from the book (p. 139), shows examples of potato shape. Those on the right have some irregularities.

I will try to describe here a very simplified and de-mathematized interpretation of what the mathematics of potato is about.

The problem is how to distinguish between a regular potato and an irregular one.

First, **we** have to decide what is regular and what is not. The concept of regularity can be applied to anything variable: shape, human behavior, diagnostic microscopy, financial transactions, X-ray and MRI images, food, and literary styles. Those properties are entirely dependent on our judgment. Of course, the concept of regularity evolves with time in each area, which is best illustrated by food, fashion, and style.

> The regularity of US politics is an intriguing subject. It is often discussed whether the Iraq War follows the pattern of the Vietnam War.

Figure 2 presents shapes of four real potatoes, two of them with sprouts, from pictures processed by a computer and reduced to contours.

To address the problem of regularity, let us start with a potato shape which **we** consider regular beyond a shadow of a doubt and call it **template**. In other words, the template is the embodiment of potatoness, as the best-in-show dog exemplifies the standard of the breed. Certainly, more than one tuber can claim to be ideal potato, but if **we** have disagreements, **we** can always vote. We can also regard the potato template as a superposition of different suggestions with the number of votes for each.

Next, in order to create a space for **all** regular potato shapes, and not just the template, the following mathematical procedure is used. We start with the template, which is a closed curve, and find transformations of the curve that generate other curves but preserve regularity. We can do without the exact mathematics and I would only mention in passing that, at least for the curves, this is the subject of group theory, a very abstract area of mathematics.

Obviously, rotation and scaling up or down (**Figure 3A to 3C**) preserve the shape, although the scaling may have its limits: a pea-size potato is certainly irregular. **We** have to set the limits of regularity.

Regularity is entirely in the eye of the beholder. This is one reason why I emphasize **we**. I do not do that if a property is in the eyes of mathematics. Mathematics does not set standards of regularity. Once regularity is set, mathematics enforces it.

Next, local variations of curvature (how small? how local? **we** decide) do not encroach on the potatoeness. Some areas are convex and some are concave, there are dimples and bumps, but on a smaller scale than the entire well rounded potato. This also applies to human body, but the fashion standards do encroach on humanity and, I suppose, hurt millions of women.

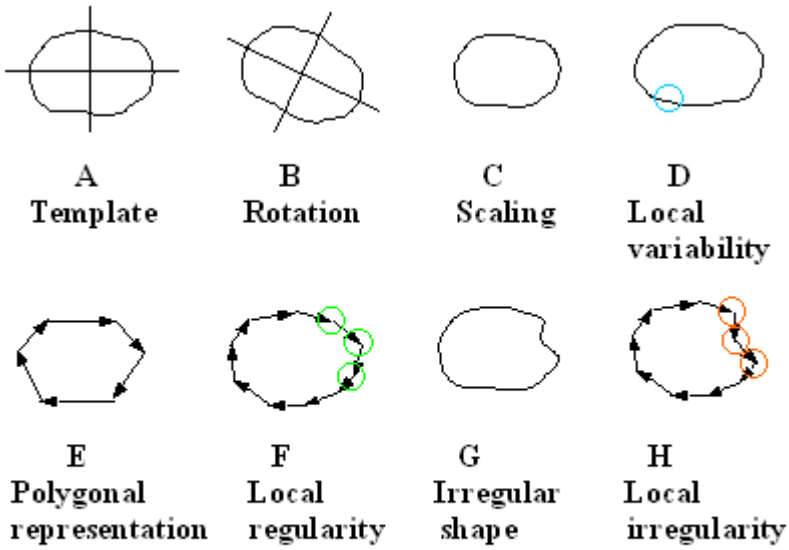


Figure 3. Representation of shape

The curve in **Figure 3D** is slightly different from the template **3-1**. This is something trickier to standardize in order to entrust computer with a camera to decide whether a particular potato in the focus is regular or not. To do that we have to develop a mathematical representation of potato shape, **Figure 3E and 3F**.

We start with a crude representation of the curve as a polygon (**Figure 3E**) and refine it by increasing the number of sides (**3F**). By tracking the polygon in certain direction, we deal only with the length of a side and its angle, or just the angle between the neighboring sides. The sides simply do not have anything else.

We admit that the sides of the polygon can vary at random within certain limits, and **we** set the limits of local variation. Of course, the polygonality must be preserved as part of potatoeness and the contour line should be closed.

This completes the **analysis** of potato shape. Instead of the awkward potatoness we can now start using the term "potato shape **pattern**." We can also measure a deviation of a shape from the template. We can deform the template at random and still remain within regularity. We can **synthesize** a lot of shapes. But all that is mathematics of equations. In human matters we can rarely do it, although Ulf Grenander and his colleagues advanced this direction for various biological and medical images and not just potato.

WHAT IS PATTERN

To define pattern, we need several things.

1. **Generator** space, i.e. list of small indivisible components of a structure.

Generators are minimal, atomic elements of shape or any other **representation**: molecule, social formation, skeleton, corporate structure, terrorist network. The generator space, infinite in the case of potato, consists of all oriented lines that form the sides of the polygon. The potato shape generators differ angle. Each has two "hands" to form a chain. Generators can have a certain bond space: a limited number of bonds with restricted ability to couple with other bonds, quite like atoms of chemical elements. Other generators may be less rigid in their ability to connect. Generators, the atoms of EVERYTHING, are discovered in the process of analyzing reality.

2. The **local rules** of bond formation between generators.

The generators of potato shape connection have two potential bonds each and they can connect consecutively, with no unconnected bonds left. The connection is called bond couple. **Figure 4** shows two generators $\mathbf{g_1}$ and $\mathbf{g_2}$ and the way they form bond couples. These generators connect at any angle. This is not always the case. Atoms in molecules have narrow limits for the angles between bonds, while the generators of corporate structure do not have angles at all because they do not exist in geometrical space.

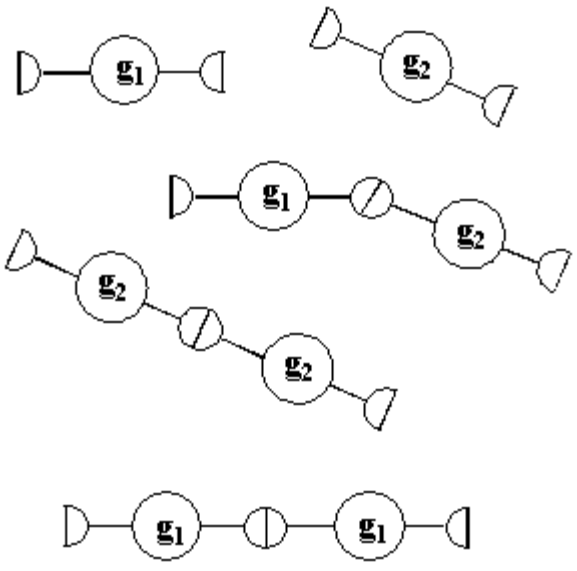


Figure 4. Generators of shape

A set of generators connected by bond couples in a certain way is called **configuration**. Thus, molecules can be regarded as configurations of atoms.

3. The **global rules** of connection between generators (could be absent).

In our example, it is the requirement that the configuration is closed, i.e., cyclic. For institutions, decisions, and classifications the tree-like connections without cycles are regular.

4. **Similarity transformation**.

It is the transformation or a sequence of transformations that generates a regular transformation from another regular transformation or the template. It may include random choices i.e., casting a random number.

For two-dimensional objects, relevant for human and computer vision, similarity transformation often can be expressed mathematically. In other cases the mathematical (analytical) form of the transformation is difficult, impractical, or impossible. For example, I cannot imagine any equations describing transformation of the configuration of the Vietnam War into the configuration of the Iraq War or, for that matter, the general patterns of victory and defeat. I do not even know in advance whether they follow the same overall pattern, although they certainly follow some partial patterns.

More exactly, the Vietnam War alone is not a pattern but a template. Together with the Iraq War it can lead to a pattern, to which the Gulf War, apparently, does not belong.

Configurations of history are, as a rule, singular and unique. The basic ideas of Pattern Theory, however, are neither analytical nor numerical.

We are the jury for the potatoes, but who is the judge for human matters?

It may seem that the choice of template is also a necessary component of pattern, but this is not so. We need a template for the purpose of selection against a standard, which can be arbitrary. In computer vision the template serves the purpose of image recognition. Natural selection does not follow a template; it creates, modifies, and destroys it. We can speak about the template of a mammal, but only in very general terms. In science and law a verbal definition serves as template. In human matters the consensus regarding the definitions is an exception.

We can do without a template by simply comparing two configurations and measuring an evolutionary (or historical) distance between them. This principle is well known in evolutionary genetics and image recognition.

This is the right time to give another reason why I emphasize human presence (**we**) in the choice of template. I attribute a very subtle and hard to catch property to Pattern Theory: unlike physics, it is open to novelty. When physics encounters a new phenomenon it has to change itself, as it happened with quantum theory. Pattern Theory requires a human participation in the choice of generators, rules of connection, similarity transformation, and global regularity each time it encounters an object. It is involved in human matters by its very nature and if friendly to human presence. If a novel pattern is detected, no conceptual correction is needed.

I can give only a negative tentative definition of novelty: a novel object is **impossible to recognize** correctly.

In this way, which may seem an imperfection as compared with a graceful physical theory, Pattern Theory is always ready to analyze and embrace a new phenomenon and register its pattern, as well as recognize an old pattern. It is fit for complex evolving systems. On the contrary, any graceful physical theory is applicable to an area of the world that has the same laws of nature as million years ago and will have the same laws for at least a million years.

Pattern Theory does not need to define its area of application. It fits anything that can be represented in terms of points and lines, which is most of Everything. Mathematical formula is a configuration, too.

For the above reasons, Pattern Theory is not a theory in the sense a physical theory is. It is a tool of understanding rather than prediction. We cannot build a bridge over a river with Pattern Theory, but we can build bridges to both past and future.

In what sense PT is a theory, what it can do, and why do we need it? It will be more appropriate to ask that after it attracts more people outside its current academic sphere still limited by computer science. Until then I would draw a parallel between patterns in human matters and mathematical formulas and equations in physics. Pattern Theory is, so to speak, the physics and chemistry of understanding the world by humans, computers, and aliens. Why physics? Because it can be quantitative. More important, it can measure instability as irregularity. But what does it have to do with chemistry?

WHAT IS CHEMISTRY

In order to explain what chemistry is I would need a lot of space. Chemical textbooks are murderously large and heavy. But with pattern ideas already presented I can do it quite briefly.

Chemistry for non-chemists is Pattern Theory of configurations with atoms as generators. This is not what chemistry for the chemists is about, but it is certainly one of its aspects. A molecule is a configuration. There are similarities between some molecules and they are expressed not by mathematical equations, but by fragments of structure. Thus, all molecules with hydroxyls (like methanol, ethyl alcohol, ethylene glycol, and isopropyl alcohol—all household products—manifest similar chemical properties along with differences. Acetone is different and there is another series of molecules with properties similar to acetone.

This kind of similarity transformation—change anything but a certain block of structure—is something alien to the perception of images. But it is akin to the perception of ideas. No wonder because shapes come from the Euclidean space and ideas have no material existence. Molecules, however, take an intermediate position. They are material

objects in Euclidean space, which matters for many chemical problems, especially in biochemistry, but they are also **ideas** about how one molecule differs from another regarding the connections between the atoms.

To illustrate this neglected side of EVERYTHING, **Figure 5** compares three similarities**.**

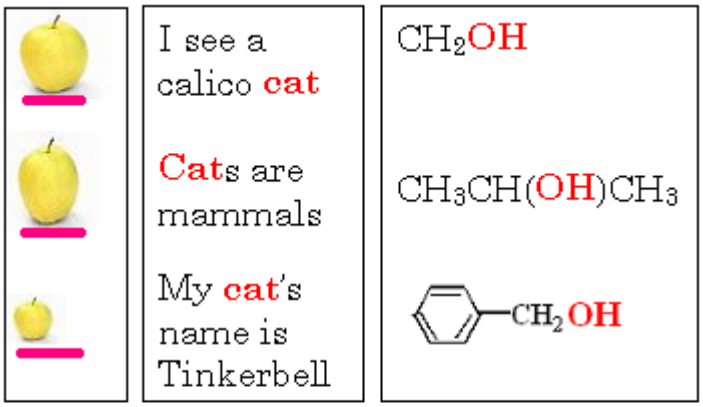


Figure 5. Three similarity transformations with apple, cat, and hydroxyl preserved

Of course, all three columns contain representations, not "real" objects. The difference between reality and its mental representation, however, is the oldest unsolved problem of philosophy and we shall eschew it.

Chemistry answers a series of questions; one of them is what happens during a chemical transformation.

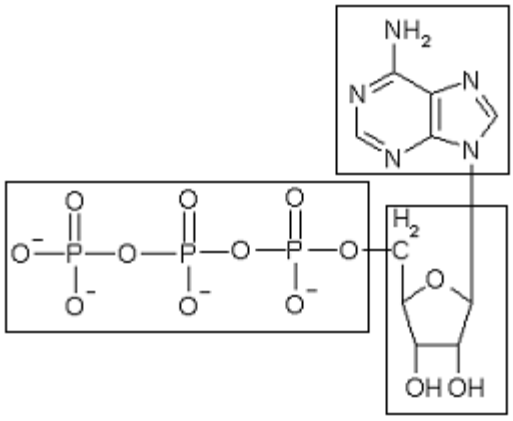


Figure 6. ATP and its three blocks

Chemical reaction is a rearrangement of bonds between atoms of one or more components. It is a transition from one, initial, configuration to another, final. Usually (I omit a lot of detail) the chemical transformations are reversible. The final configuration immediately starts transition back to the initial one.

It all goes toward (more detail is omitted: it can go sideways) the so-called chemical equilibrium in which the mixture of the initial and final configurations has minimal **energy**. (I omit even more detail here). If there is no such minimum, no chemical reaction will run

on its own because anything in nature can run only down the energy slope. Unless something pushes it up.

From this crucial "unless" life emerges: there is a way to pump energy into the system and keep it in the high energy final state, preventing from rolling down toward equilibrium. This is what life is from the point of view of physics. Not accidentally life emerges from a chemical system: chemistry can provide a mechanism for that. This is the absolute square one of life and it can be achieved in rather simple systems without proteins and DNA. A biologists would not see anything alive in such systems, but they open a way to systems of growing complexity and ultimately to the life forms as we know it.

The key word is ATP: adenosine triphosphate, a very simple thing (**Figure 6**) , which plays the role of money in the economy of living cell. The ultimate source of ATP in plants is the sun light. (**IDEA 4** of Michael Pollan's book). ATP is the currency of energy and all living cells use the same dollar bill of ATP. Animals, however, print their biodollars with the energy of not light, but food. The entire majestic complexity of living nature and crazy complexity of human society have evolved on the available source of energy (**IDEA 2**). As result, natural history and, much faster, human history became a **history of instability** and continuous and contentious search for a greener pasture (**IDEA 3**).

WHAT IS INSTABILITY

Unlike energy, instability is not a universally accepted, defined, and understood property outside physics and mathematics. In my eyes it makes it an ideal substitute for energy, which is a universally accepted, understood, measured, but highly tainted by physics concept.

Without going into details, when **energy** of the system increases, especially, in an non-uniform, local manner, its instability goes up and stability goes down, which means that the **probability** of the state with higher energy is less than the probability of the state with a lower energy.

My personal problem with energy and probability is that both are the most fundamental concepts of science and, as anything truly fundamental, they cannot be defined to the satisfaction of all who dwell on this foundation. They can be defined for particular systems. I am interested in EVERYTHING and for me stability/instability embraces all of Everything. Moreover, since **human matters** are in the focus of my attention, stability is better understandable intuitively than energy.

High stability means that the system cannot be **expected to change** in near future, but **we have no idea when**. High instability means that change is coming, but **we have no idea**

when. In mathematical statistics probability and energy are related **for well-defined systems**: the higher energy, the lower probability. But in human matters we never deal with well-defined systems. One reason is that we do not know what people think, but there are plenty of other reasons. One of them is that we never encounter closed systems in real life. An open system cannot be defined without some substantial knowledge about the larger system that encloses it.

We talk about stability, stabilization, instability, and destabilization regarding such poorly defined systems as markets, fashion, weather, economics, politics, war, tastes, careers, family relations, and love life. It is also known in human matters as stress, tension, anxiety, uncertainty, and frustration. This justifies in my eyes the use of instability instead of practically synonymous energy and probability. Energy is for inanimate matter of for a well-defined part of life, as in biophysics.

When we deal with the sun light and mineral fuel as the source of physical energy for our civilization, we can measure it in physical units only. We can predict with certainty that any instability of the energy supply will cause instability of our entire life, as it happens on small scale after a hurricane or tornado interrupts power supply to our homes.

In chemistry we use energy instead of instability. The great blessing of chemistry is that chemical experiment today is simple (small kitchen counter will do), usually fast (most results overnight), low cost, reliable, reproducible, and scalable. This is why the chemists get their answers from experiment rather than from equations. Besides, no equation can produce the material sample in a vial. Moreover, we do not need to know the absolute values of energy and can operate with differences.

WHAT IS TRANSITION STATE

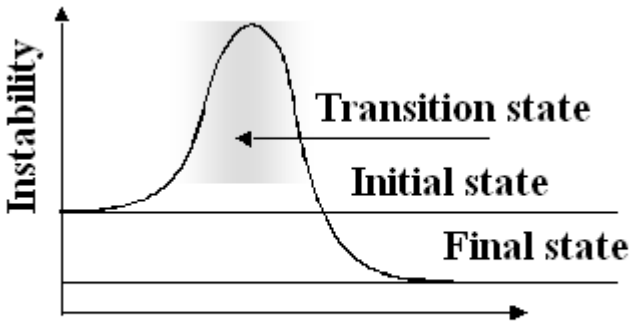


Figure 7. Physics of transformation

The most important question we can ask regarding large evolving complex systems is not what can happen with them—anything imaginable can indeed happen—but **when** will it happen. Most things that we imagine, like hitting the jackpot in lottery, will never happen during our lifetime. The answer is: **it is what can happen faster that most probably will happen indeed**.

Transition state is the fleeting, unstable, **irregular** configuration between the stable initial and final ones. It is always **very** unstable in chemistry because it is irregular. If the transition states were stable, anything that happen in the world would immediately slide down to the most stable equilibrium and freeze there. That will be the true end of the world. The transition state limits the speed of a transformation from one stable structure to another, see **Figure 7**.

To avoid repetitions, I refer the reader to other web pages of this site. See Essays **8, 23, 25, 26, 27, 29,** and **49** and pdf files Molecules and Thoughts, Transition States in Patterns of History, The New and the Different, History as Points and Lines , as well as almost all the other files in complexity. Transition state in chemistry is well presented on the Web.

CHEMISTRY OF PATTERNS

Pattern Theory of transition states has not yet been developed, but it is obvious that they can be naturally accommodated. Computer experiments with pattern simulate transitions between two regular configurations through an intermediate irregular one.

Figure 8 is a visual metaphor of a transition state between two regular images.



Figure 8. A visual metaphor emphasizes the irregularity of an unstable transition state between two stable ones

I believe that full-blown **chemistry of patterns in human matters** is the most exciting goal for an adventurous exystemologist. Alas, a grant is by no means guaranteed. But you can do it just for the fun—and maybe glory—of it. The concept applies to reorganized institutions, reforms, wars, politics, electoral campaigns, decision making: to EVERYTHING.

PATTERN HISTORY

Sometimes a historical change is quasi-reversible: while complex configurations do not repeat, patterns do. For example, the formerly stagnant history of Soviet Russia now offers patterns of change. The old authoritarian patterns, however, come back.

When we speak about butterfly effect as a pattern "large consequences from small causes," how can we measure the size of consequences and causes?

The most general measure is instability. It can be compared with the waves of a stormy see. The stormy periods alternate with quiet stretches. History of any nation looks like waves of instability
—revolutions, wars, invasions, calamities, fast growth, radical reforms—alternating with periods of quasi-equilibrium, peaceful development, gradual progress, or gradual decline.

Figure 9, taken from *History As Points and Lines* (Figure 21-7), is a typical example of history as weather. Any point of the wavy line stands for a certain social configuration. Some of configurations of history are given in the book. They would look less naive if drawn by professional exystemologists.

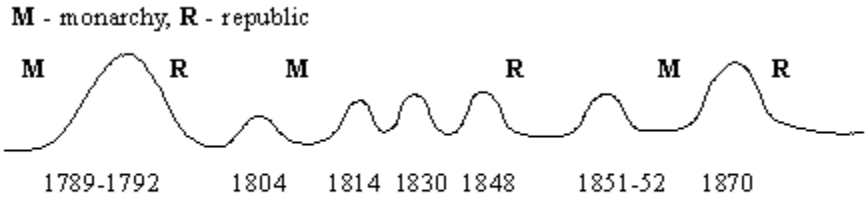


Figure 9. The historical roller coaster of France

Figure 10, which is a modified Figure 23-1 from *Points and Lines*, presents the first wave of **Figure 9**. Obviously, the alternation of ups and downs in a sequence of events repeats on different scales in a sequence of events. I call it quasi-fractal structure of history (**Essay 49, Terrorism and its Theorism , Appendix 3**). See **Figures 3** and **4** from **Essay 49**.

The word *quasi* points to the main distinction of history: configurations never exactly repeat, quite like the shorelines, but in time, not in space. The map of history is never finished and a new Columbus is always welcome.

The broken red line represents the overall trend. But the trend of what? Instability is just energy, modified to fit EVERYTHING, and especially human matters.

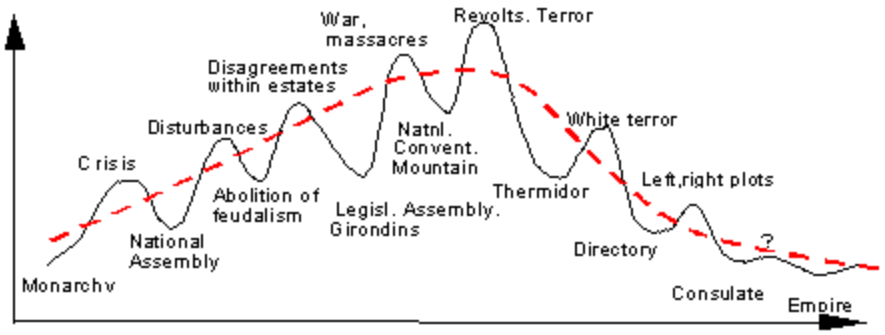


Figure 10. The instability profile of French Revolution

To research the consumption of energy in the form of food, fodder, fuel, and gunpowder during a stretch of history is an impossible task for me. I can, nevertheless, hypothesize, that the red line in **Figure 10** has a thermodynamic and/or kinetic origin: it is the graph of dissipation of consumed energy in the form of human activity, murder, and destruction. It reminds me of the development and self-extinction of a bonfire, which is a chemical process. It can be maintained by firewood thrown in along the way, but not forever.

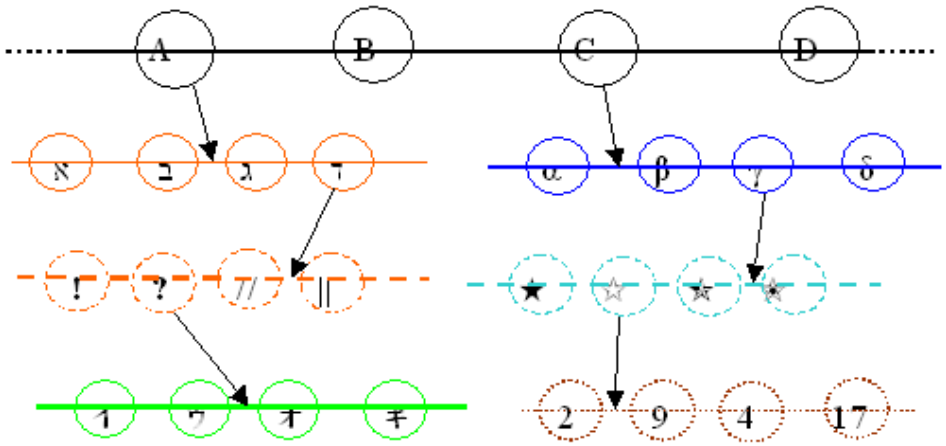


Figure 11. Quasi-fractal structure of history

To disturb energy supply means to disturb the hornet nest of history. I suspect that the analysis of energy consumption and dissipation would confirm a lot of our intuitive guesses about the stretch of history we are in. The entire modern history of Middle East is literally fueled by oil, and a pattern historian could, in principle, shed light on the reasons why at some conditions the energy of oil is dissipated in the form of violent heat and at other conditions is used for creative growth of ordered complexity.

Hint: **What matters is, probably, the height of the transition barriers toward either production or violence in different cultures.**

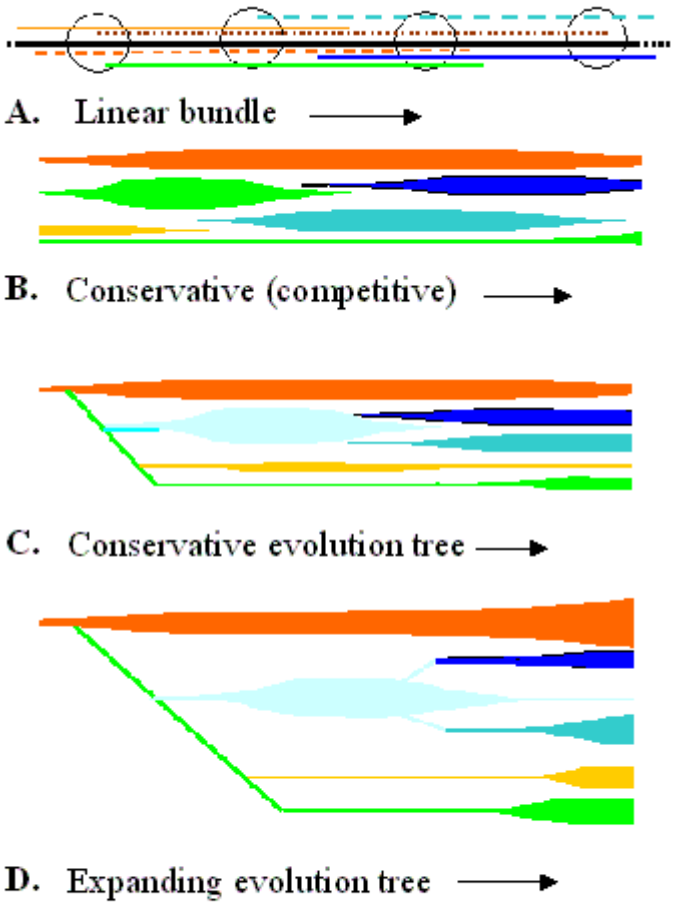


Figure 12. Energy consumption in history

From my non-professional point of view (no common professional point of view exists in history), the French Revolution was an outcome of enormous accumulation and **concentration** of wealth by the King and aristocracy. France was a pile of dry brushwood. The food shortages as result of price hikes played the role of a spark.

A process of accumulation and **concentration** of wealth in America seems to be a fragment of the same pattern and another imperial, feeble-minded, and un-American presidency might complete the configuration.

Consumption of energy is the crucial dimension of any history, from evolution of species to the evolution of National Public Radio. Dissipation of energy is equally important. Probably the best measure could be production of order (or chaos) per unit of energy intake, but such things are beyond my competence.

I am aware of the attention of modern historians to the economic aspects of history. What should be added is the patterns of configurations and their transformations: the chemistry of history displaying between the waste of ritual bonfire and the creativity of work.

In **Figure 12A** the line segments of different color represent trends with beginning and end, as it is done in typical timelines of history. The circles symbolize the necklace-like linear pattern of event sequence.

Figure 12B reflects the metabolism of a system with history: various trends of history portrayed as colored cigars, are constrained by a constant resource of energy (sunlight is an example of such resource). The constraint causes competition. The width of the cigar (or peapod) corresponds, roughly, to energy consumption that results in complexity and instability.

Figure 12C reflects the complexification of an energy-constrained system. This pattern applies to biological evolution. What we do not know is whether the entire biological evolution is just a transition state toward a steady state or, maybe, it is just a single cigar and something else will squeeze it in the future. Biological evolution is, no doubt, squeezed by human presence, but are humans losing their biological nature? It looks like they do, but this is a separate big subject, rather well explored, but not yet taken seriously.

Figure 12D shows an expanding evolution on an unlimited resource of energy. We do not have anything unlimited on Earth, but that has been the type of human evolution since the Industrial Revolution. The question is, what is going to happen next as result of the collapse of the oil bubble? Will EVERYTHING, including living species, form yet another **single** cigar rolled by human hands? Which social patterns will survive, which ones will die off, and which ancient germs of history, deep in the soil, will wake up?

In am on a shaky ground here but historians with attention to economic aspects may sense some quite familiar in mental contortions of a chemist.

THE LIFE OF THINGS

I regard man-made Things as a new big component of the system called planet Earth. Technos, or **technosphere**, in the Vernadsky tradition, is thought to be brought to existence by human desires.

I see in Technos a new super-kingdom of life or, to be more exact, a separate evolving complex system, on par with living organisms and human society. I am sure that today Vernadsky would separate it from the noosphere, but he died in 1945.

As animals diverged from plants and humans later diverged from animals, the things have been diverging from humans since the appearance of digital code, the thingish equivalent of genetic code.

Here we come back to Michael Pollan, a writer with interests comprising a very big chunk of EVERYTHING. I believe that Things use humans as much as humans use Things. I believe they **desire** each other as much as plants and humans. They can also hate each other. I believe that the belt of the suicide bomber is the killer as much as the bomber himself. More important, Things can compete for resources, and not just space, energy, and matter: the most strained and hopelessly limited resource in our times is time itself.

I believe that the Things with stored digital blueprints are the newest really big historic evolutionary **cigar-** , **peapod-, lens-,** or **torpedo-shaped** trend after the Industrial Revolution (**Figure 13**). They have been moving to the same position of domination that the humans are used to in relation to organisms and things. They take good care of those who take care of them. They are our gardeners.

The peapod in **Figure 13** (compare with **Figure 10**) symbolizes a historic period with events inside. We can see today only its present end. Can we foresee its distant end?



Figure 13. Shapes of historical trends

This is, of course, too much for this Essay. I have been writing about this troubling for me subject mostly in simplicity, but this time I can refer to the third section of my spirospero site: poetry in English.

THE CHEMISTRY OF DESIRE

	Self	Goal
Real	▮	●
Ideal	▯	○

Figure 14. Atoms of desire

To say that I desire a candy as much as the candy desires me would be simply a statement of our belonging to the same system. Economists and businessmen know that very well. But what is desire from the point of view of a chemist? For a chemist the world is not just pictures from putty balls and toothpicks: it is a process. I am not familiar with psychology of action and this is pure my guesswork.

My desire to possess a candy and my attempt to get hold of it includes four participants, **Figure 14**. Two of them are "real" material objects: myself and my goal. Two others are my ideas of myself and my goal.

The process consists of several stages. First, I perceive my goal, next I evaluate it against my **context** (current state, long time preferences, recent history, long time history, negative factors), and then I actually decide whether I really desire to achieve the goal, and if so, I act. The success may be guaranteed for a candy, but not necessarily with more complex goals requiring more resources of energy and time.

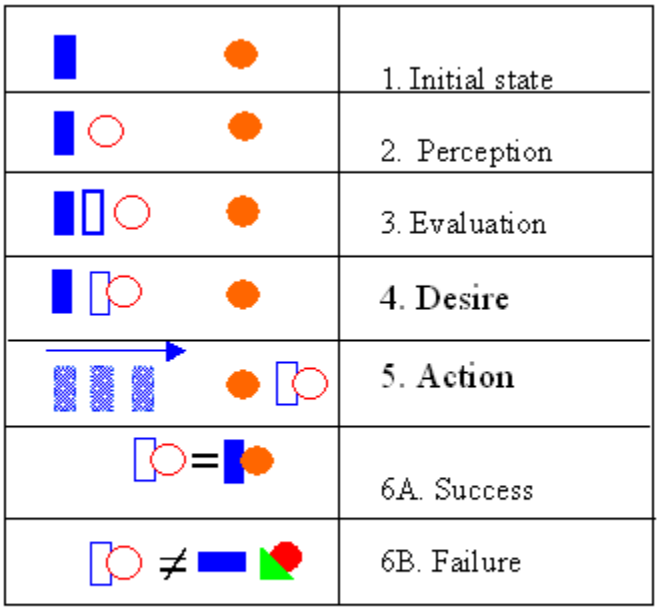


Figure 15. Stages of possession

In **Figure 15** the stages are:

1. Myself and the goal are the only components of the system.

2. The image of the system appears on the border between myself and the goal.

3. My image of myself joins the system in the context.

4. The image of myself connects with the image of the goal: I imagine possession.

5. I reach toward the goal.

6A. The image of the goal does not contradict the physical state: success.

6B. The image of the goal contradicts the physical state: failure.

A pattern chemist sees more.

Depending on various external and contextual circumstances, I can interrupt the process at any stable stage. Whether I move from stage to stage, it depends on the instability of the transition state between the stages. For the entire pathway from perception to action, the instability profile looks as in **Figure 16.** Whether it goes to the very end depends on the relations between minimums and maximums along the way. Personal relations, professional life, and especially love are full of chemistry of this kind.

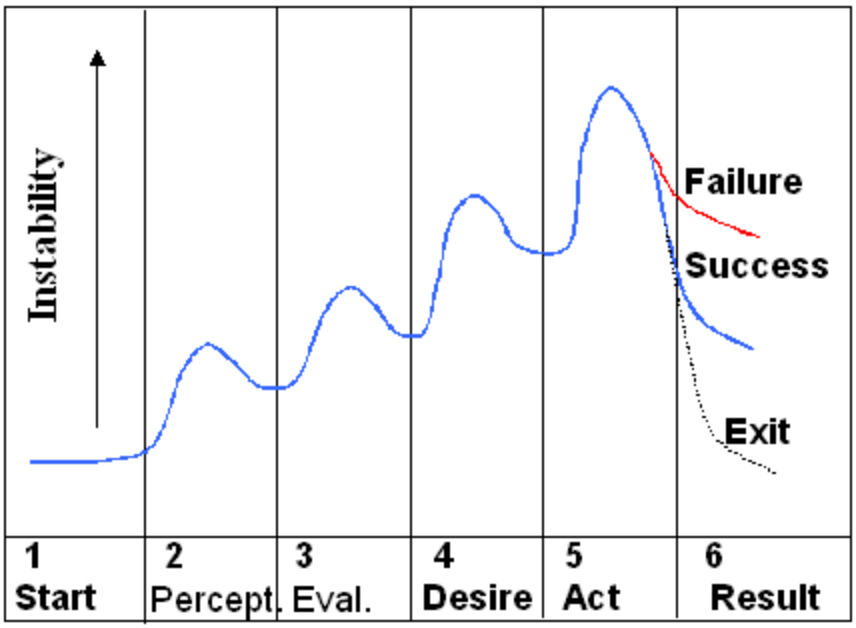


Figure 16. Transition states of desire and action

INCONCLUSIVE CONCLUSION

The above is part of the picture in my mind, which Michael Pollan's epic tribute to the grass under the sun illustrates. We can see from a new angle the wars for land, of which human history mostly consists. They were waged, literally, for the place under the sun, only more for grass than for humans. Grass was the first energy resource used by humanity for conquering distance on land—on horseback—and conducting even more wars. Grass and grain were the oil of Middle Ages, tapped right from the sun. Our Western civilization started, in Africa and Asia, in areas where grass for food could grow well along the great rivers.

History is a record of human bonding to land under the sun, their subsequent infatuation with dead Things growing with roots immersed into dark oil, and gradual emergence of the life of Things, with their own digital genome and the pending emergence of the digital mind.

What is going to happen next? Global bonding of humans to each other? Global beehive? War of Things for parcels of our personal time? Dehumanization, dematerialization, numerization, digitalization? Divorce between humans and Things? Growth of a human-thingish Leviathan? Exhaustion of resources and the end of the peapod of the Industrial Revolution?



Q. What is going to happen?

A. What can happen faster.

Some questions

1. What do we gain, if anything, by regarding history in the exystemic framework?

2. Buildings and idle machines may need maintenance, but not a constant intake of energy. Why do we need to supply energy to maintain order in an exystem?

3. Why would a system in steady state move to another steady state? What is the driving force of change in exystems? Why are they inherently unstable?

4. Do we really need historical stability?

5. Why are we obsessed with growth? What are the hidden consequences of growth?

6. Can we predict anything in history?

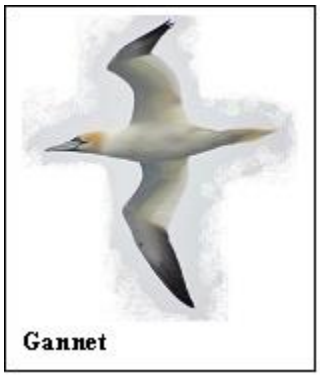
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Essay 52. A Supper with Birds and Planes

1. BIRD WATCHING

I am not an expert in any of the areas I am going to touch upon in this Essay.

My position can be compared with that of a train spotter or plane spotter, none of whom is expected to be a pro in railways or aviation. Even a birdwatcher is not expected to be an ornithologist, although some experience with binoculars may be required for this kind of hobby.


Gannet

I once felt myself a birdwatcher when I had rushed to the ocean front to watch gannets, rare visitors to Rhode Island coast. The large birds spend all their lives among the waves, settling on the ground only for nesting. A day before I had no idea this bird existed. Announced by a local newspaper, it just came into my view from its usual northern habitat separated by geographical distance from my own.

But what is distance? Even in space it can fluctuate, all the more in time.

Abstract combinatorial space is the third kind of distance.


F-16 Fighting Falcon

A child can look more after one parent than the other, a US President can show a startling similarity to a somnolent Russian leader of the bygone era, and the gannet still looks to me, an occasional bird spotter, closer to the albatross than to the pelican, although the ornithologist knows that gannets and pelicans are closer relatives than gannets and albatrosses.


Albatross

The latter belong not only to different **families** but also to different **orders** of birds, which is a higher level of distance. Thus, the invisible abstract kingdoms, phyla, classes, orders, families, and genera reveal to us something about the

visible individual birds.

Birds are also closer to airplanes than to sewing machines and seaweed. The planes not only are born to fly but also look somewhat similar to the birds. Is there an abstract space to accommodate both gannets and albatrosses but also the planes?


Pelican

Of course, we can put all three in the category of flying objects, but that would completely obscure their origin and relation regardless of how we, humans, see it and more the way we see the relations between aquatic birds.

To put them into the same system, we need a taxonomic unit above kingdom. I will call it sphere, following the ideas of Vladimir Vernadsky (1883-1945), who saw the planet Earth as a union of at least three apparently concentric spheres: geosphere (minerals), biosphere (life), and noösphere (human reason). The spheres developed consecutively, changing the earlier ones. Thus, life created soil and oxygenated atmosphere on the previous geosphere.

None of the three terms was invented by Vernadsky, but his entire vision of the subject (and the subject itself, still undefined and undeveloped today) retains its grip on the imagination of many modern thinkers.

In **APPENDIX 2** I present some excerpts from Vernadsky's only widely known paper (1943), translated into English in 1945 by his son George Vernadsky, an American historian. His entire published heritage, over 400 titles, is little known outside Russia where his name is today surrounded by a hype.

Vernadsky supported the idea of J.D. Dana (1813-1895) , the contemporary of Charles Darwin, who wrote about "cephalization" of the world as a definite direction in the evolution of life. Vernadsky, however, quite naturally, believed that the noösphere was the last stage in the evolution of planet Earth as a whole.

> **NOTE:** I don't think we could be sure about anybody's version of the end of history. I see two options: convergence of humans and machines and divergence and competition between them. The two options are, strangely, compatible in a version of the coexistence of humanized machines and machinized people or in a coexistence of the "converted" ones and the primitive old stock humans derisively called renaissanceniks, or rens for short. We can see both trends today. Actually, they are very old. Slavery was the first experiment in machinization of humans, maybe even older than domestication of working animals.

Vernadsky's idea, also echoed by James Lovelock's concept of Gaia (1970), gives us the main reason to extend the biological taxonomy and fuse it with the taxonomy of man-made and man-run things (F-16 is both). Both comprise material objects made of atoms and molecules. There is no reason why ideas and algorithms for humans and machines

should be forbidden to join the universal taxonomy at some level, but I will pass over this millennia old question.

In the following table **Taxonomy of two flying species**, I tentatively expand the classification of objects in the spirit of Vernadsky's idea that there is only one single process of evolution on planet Earth and it proceeds in a definite direction. This evolution, as I see it, is probably the least explored among the most important phenomena on earth. As always, I stay away from theories and, like Vernadsky himself, prefer the illustrative way of approaching the entire realm of large complex evolving systems (**X-systems** or **exystems**).

Taxonomy of two flying species

Galaxy	Milky Way	
Star	Sun	
Planet	Earth	
Sphere	Technos	Bios
Kingdom	Machines	Animals
Phylum	Aviation	*Chordata*
Class	Jet	*Aves*
Order	Military aircraft	*Pelecaniformes*
Family	American Air force	*Sulidae*
Genus	Fighter-bomber	*Morus*
Species	F-16, Fighting Falcon	Northern gannet, *Morus bassanus*

NOTE: The sphere of Infos can also be included into the unified taxonomy, as the following makeshift example illustrates:

Infos — abstraction — property — position — time — movement — active — aviation (flying)

The above **Table** illustrates a very simple and not new idea that both man-made things and living organisms have a deep underlying similarities that place them together as forms of generalized life. The similarities are:

1. Technos and Bios (Things and organisms) reproduce and multiply.

2. Information for reproduction is coded and linearized into a string of symbols. Since the advent of digitalization of information, the digital code for Technos is as universal as the nucleotide code for bios.

3. The code changes by random mutation and/or planned recombination (now for bios, too).

4. The generalized life is an open non-equilibrium system.

5. Technos and Bios are generalized life forms competing for limited resource of matter and energy.

The intricate webs of relations between very different and distant species inhabiting the same territory are well known. We are also aware of complex relations between humans and the rest of living organisms. The antagonistic relations between birds and planes—and drones and planes—at the airports are just one example.

Appropriating the above intellectual platform, the question about the relation between humans and things is natural and it has been posed many times. Since Technos has not yet been known for recording its own history, human history is the only and probably biased source of facts.

The recent book *The Shock of the Old: Technology and Global History since 1900* by David Edgerton (Oxford University Press, New York, 2007) is an example of a contrarian interpretation of indisputable facts.

2. HISTORY WATCHING

History watching is my hobby.

History has been compared to the train, probably, as much for its propensity to be derailed as for the deadly crushing power. Today history may just drop from the skies in the form of a large passenger plane. Or a flock of them. It can also sprout from long ago contaminated soil.

It is unnatural to draw a parallel between the appearance of the brisk beautiful gannets at Rhode Island shores and the flight of the suicidal and murderous planes on September 11, 2001. There is neither science nor religion to view both in the same frame of reference. The harmless (for us, not the fish) gannets had existed, probably, for millions of years, while the hijacked planes ... but wait a minute! they had existed too, as political species, and they came from the past, too, as a product of a long evolution. After 9-11, hundreds

of experts traced the evolution of suicidal terrorism as far back as the story of Samson and Delilah.

The difference, nevertheless, is fundamental: the gannets came from the past and distant present, while the planes came as omens from the future. Poetic imagination, unlike science and religion, can accommodate both, which I have just done without even writing an inevitably shallow for such a subject poem.

3. FOOD WATCHING

This Essay is neither about terrorism, nor about ornithology, nor even about poetry. It is about something that had existed only in my imagination, until I saw, just recently, the first sign of the future as real as a bird or a plane.

The sign came in the form of a bunch of news about the emerging controversy. Here we have to descend from the skies not onto the waves but on a firm and cluttered ground.

The energy crisis and the looming exhaustion of mineral oil resources have drawn attention to the so-called alternative fuels, of which ethanol is the most common, well known, and widely used. The terrain is tricky, messy, and labyrinthine because the fundamental terms, such as energy, work, temperature, and chaos, neither have a single standard definition nor can have it in principle because there is nothing more fundamental to refer to. To start with definitions for fundamentals means to get lost in circular motion.

Ethanol, **CH_3CH_2OH**, i.e., alcohol, (ethyl alcohol, to be precise) is one of the most ancient chemical companions of human culture, as well as vulgarity. It is produced by fermentation of various natural sources containing simple sugars: from grape juice to mare's milk. Wheat, barley, rice, potato, and corn contain almost no sugars (they are not sweet) but have a lot of starch, a polymeric form that can be easily split into sugars and fermented. The main component of all dry plants is cellulose. It is more difficult to split cellulose into simple sugars than starch, although a non-chemist would hardly see a difference between their chemical formulas.

> **NOTE**: In chemistry sugars are a class of substances, not the crystals in the sugar bowl, which are sucrose.

The metaphorical albatross of alcohol comes as a good omen but imposes the choice—or balance—between using corn for alcohol as a gasoline substitute and using the same corn for food.

An economist could see the situation as a new arena for the intervention of the invisible hand of market, but I see it as the first real ring for the competition between Things and humans for food. Moreover, it is a manifestation of a new emerging taxonomy in which we have no choice but to place food and gasoline into a higher classification unit: source

of energy, for which I see no obvious single word term, but **fuel** could be a kind of compromise. Both are, thermodynamically and chemically, fuel: stuff that oxidizes to produce energy.

Human food is a source of both energy and nutrients, i.e., matter, while gasoline is just fuel, although it could be an industrial source of matter, too. Chemically, polyethylene and gasoline are much closer than chimpanzee and human. Corn is used by humans and animals as a source of energy rather than nutrients because carbohydrates, the major component of corn, are present in animal organisms in very small quantities.

Liver contains a limited amount of important starch-like substance glycogen that serves as a kind of energy cash on hand for emergency use.

Therefore, I would accept the term **fuel** for the taxonomic unit comprising both food and mineral fuel. Fat and oil of animal and plant origin are also the source of energy more than of nutrients. Cars can run on used frying oil. It looks strangely, but the term **oil** in English would also serve as the family name for food and mineral fuel. The Greek term for work, **ergon**, would fit all languages, except, maybe, Greek, because food and fuel, or, in physical language, the **free energy** (confusing term for energy convertible into work) is what keeps humans and machines **working**.

Gasoline, however, is already a hidden component of corn. Food production and transportation requires a lot of fuel just for mechanical movement of tractors and trucks. In a sense, we drink not just milk, juice, wine, and beer, but also gasoline and diesel fuel.

The current dilemma—how to feed our civilization—is well recognized and I have nothing to add to the discussion.

Google, May 25, 2007: Results **1 - 20** of about **2,560,000** for **corn gas OR gasoline**

The current energy crisis—the global firestorm ignited by the Industrial Revolution and windblown by the distinctly biotic drive of Technos to grow and multiply—is a rare opportunity for the next generation to watch one of the most radical evolutionary events on earth. Indeed, the end of mineral fuel is for industry like a dimming of the sun for global flora. What is going to happen is really hard to predict, especially if the effects of global warming add up to the boiling politics.

Intuitively—although I believe it can be demonstrated scientifically—I can see in the future the autocratization (opposite of democratization) of developed societies, which can be illustrated by the following visual metaphor of the independence landscape, **Figure 1**.

After my WW2 childhood, decades of Soviet scarcity, and prison years, food has for me an aura of sanctity even though I have never experienced hunger other than of my own intent. I have a physical sensation of committed sin when I see destruction of food and I instinctively try to prevent it for as long as possible or at least to feed the remnants to other living creatures. I have a good reason to believe that my attitude toward food is

shared by millions, if not billions of other people. In 2002, one billion of people (20% of population) lived on $1 a day.

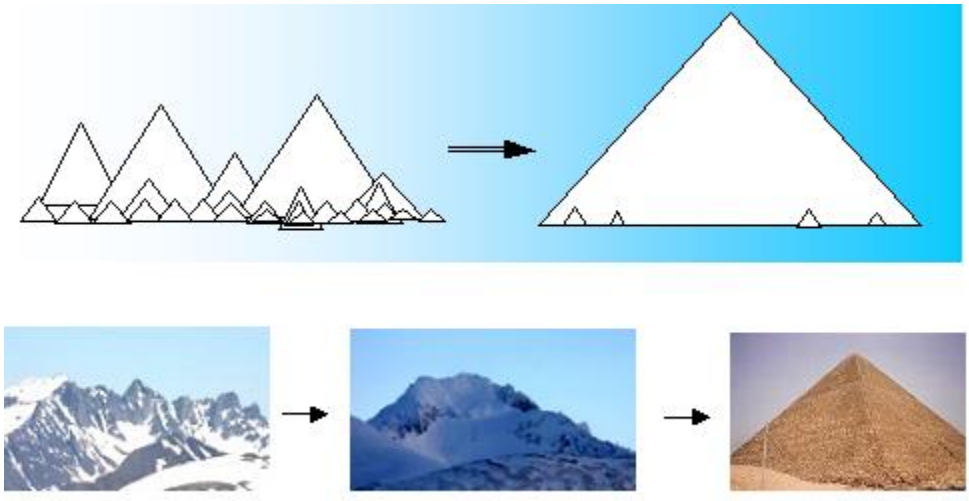


Figure 1. Possible global restructuring as result of diminishing supply of energy.
Top: schematically, bottom: metaphorically. Each peak means an independent self-governing subsystem . Source of the mountain landscape. (Norway)

NOTE (2016). If the current sharp drop of oil and gas prices is taken as an end of the problem of finite energy resources, it is like taking a January thaw in New England for the end of winter. It is possible to live without mineral fuel, but for a price of redesigning the entire current civilization that worships the god of Growth and smaller deities like Democracy, Equality, and Justice. But who knows… maybe. Will we pay the price with our own life, see **Essay 1**? As a historical fatalist, I have no reason to worry.

4. SHARING FOOD WITH MACHINE

Today we are nudged by the forces of history to reconsider our menus and start feeding our cars and machines with human food, washing down our own burgers with gasoline. In our times of religious craze, especially in America, what should we think about the delicately expressed, but in essence stern message: **You should earn your food by the sweat of your brow?** Not by mineral oil? Not by money? Not by birthright?

The new dilemma, therefore, is: Should we share our food with machines?

Note my chauvinism: I don't question our right to drink gasoline.

This looks like an extension of the omnivore's dilemma in the sense Michel Pollan posed it in his book *The Omnivore's Dilemma*. The dilemma of the global community of species is also more in the sense of Vernadsky. He, however, omitted Technos from his global picture, probably, because he identified it with reason and saw as a part of noosphere. Regardless of any detail, his main idea remains convincing: each new evolutionary layer over the initial prebiotic geosphere changes the older layers.

In purely symbolic fashion, without any serious analysis at this point, I envision the evolution of geosphere as a sequence of splits, **Figure 2**.

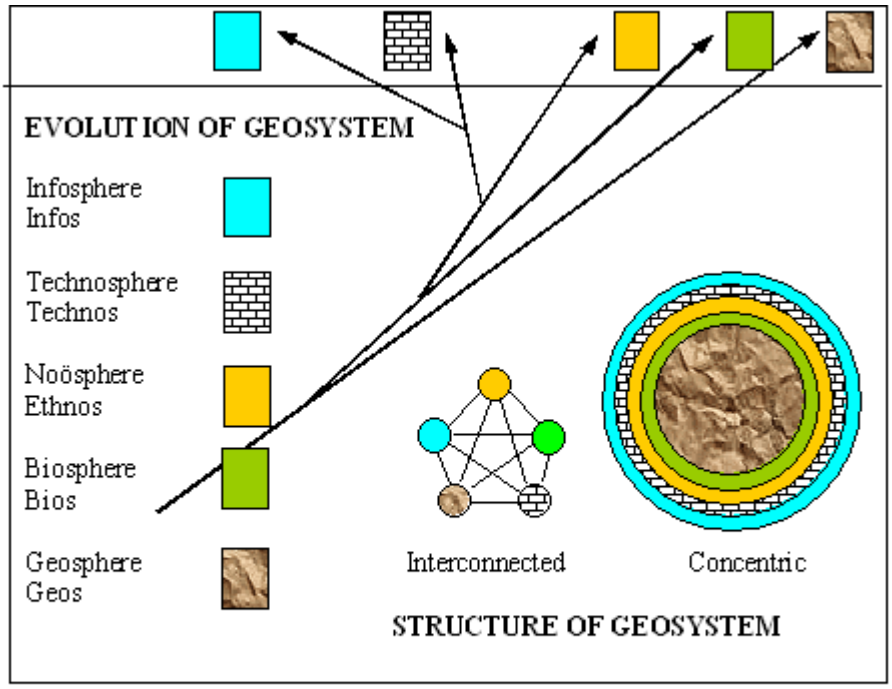


Figure 2. Hypothetical divergent evolution of geosphere as a system with consecutive arrivals of new subsystems

We are used to share our food with strangers and friends. **Bios** (life), **Infos** (reason), and **Technos** (Things) are the three competitive residents of planet Earth with complicated and confused relationships with us, quarrelsome humans whom I call **Ethnos**, experimenting with terminology.

The era of worshiping the so-called progress, when nature with its creatures and minerals, reason with its quest for truth and justice, and technology with its inventions, medicine, and weaponry—so awesome that war becomes unthinkable—all serving homo sapiens, seem to be losing steam. Progress becomes a business term.

Modern Islamism is an example of how small groups of people in command of germs, chemicals, ideas—radical, as well as traditional—and the latest material embodiments of progress can successfully pursue the quest for destruction of large groups of people **and**

machines by using a human being as a machine. The modern and futuristic medicine promises an even deeper than surgery intervention into the biological nature of a human being by treating it as a **machine** by methods of molecular **engineering**.

What are the man-made machines? Aren't we machine-made machines, at least in part? Just look at our possessions in closets, basements, and garages.

I tried to answer this question from a point of view that was probably not new, but I had nothing to refer to in terms of the modern picture of the world. There must be something in the literature, but I am just not aware of it. I know that the doubt and suspicion regarding technology have never been completely erased from human subconsciousness and from time to time they surface in honest or speculative appeals.

> **NOTE**: Langdon Winner regards technology as a form of life, which is not the same as life form. By form of life he, apparently, understands the way of human life that is imposed by technology on humans, as TV exemplifies. I completely subscribe to his questions and doubts addressed to progress in *The Whale and the Reactor* and subsequent publications (Are humans obsolete?), but I regard technology rather as a life form, i.e., a taxonomic unit, a kind of "super-kingdom" of "meta-life," for the lack of more elegant terms in the untidy slums of modern professional vocabulary.
>
> > Are we going to design and build circumstances that enlarge possibilities for growth in human freedom, sociability, intelligence, creativity, and self-government? Or are we headed in an altogether different direction? (*The Whale and the Reactor*, p. 17)

I believe that the pronoun **we** in evolutionary context today can mean only **we: humans, Things, organisms, and ideas.**

In **APPENDIX 1** I assembled quotations from my Essays and other Web publications in order not to repeat myself in the main text.

Here I simply refer to what I consider a confirmation of the main thesis: technology becomes an independent player in betting on the global fate, a kind of China and India, never being taking seriously until recently. We all compete for fuel: the China of people and the China of machines.

It is my next intriguing problem: what is the thermodynamics of ideas?

I could stop here, but I am tempted to add some general considerations regarding thermodynamics and kinetics of history.

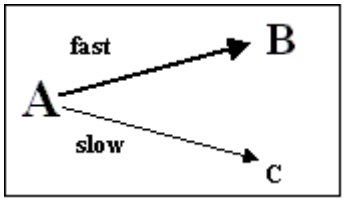
5. THE RUNNING EVENTS

The controversy of feeding machines with corn has given me the first evidence that competition between humans and Things as different taxonomic spheres has already in progress.

> **NOTE** (2016). Things are competing with humans for space, energy, human time, attention, companionship, love, and procreation. Human personal secrets can be seen more important than human life, as follows from the Apple-FBI encryption controversy. Drones and "Internet of things" promise new sources of strong insecurity. Things compete for high ranking among human needs, promoting exchanging megabytes of gratuitous messages and pictures.

As much encouraged as discouraged by that, I am trying to formulate here my point of view, the only possible merit of which is that it is coming from a chemist.

In chemistry, when two different transformation start with the same initial molecule, the fastest transformation determines the outcome in the short run. It is called kinetic control. For example, if **A** can change into **B** faster than into **C** , the fast transformation quickly reduces the concentration of **A** available for the transformation into **C**. The rate of chemical reaction is always proportional to the product of concentrations of all participants in the act of the transformation, in our case, just single **A**, which is a limited resource. If **A** was an unlimited resource, **B** and **C** would form at different but **constant** rates. The fastest transformation depletes the resource of **A** available for the alternative path, so that the formation of **C** becomes negligible. Chemistry has to deal with competition in its simplest kinetic (i.e., speed-dependent) form, which is wide spread in business, politics, war, sports, and personal life. The fastest wins.



In a track and field run, the outcome depends on the abilities of the runners and not on their interactions. In a chemical run, however, when two chemical transformations of the same substance run concurrently, the faster one kind of sucks out stamina from the slower one.

Earlier I (and, I am sure, quite a few professional economists) connected the declining birth rate in developed and even some developing countries with the competition between children and Things for the parental resources of time and money. You have to pay the stork for the baby with a credit card and a missed TV show. It is difficult, however, to prove it without a serious research, of which I am not aware at present. The fact is that economic progress slows down the birth rates. Things eat people.

> "…your sheep that were wont to be so meek and tame, and so small eaters, now, as I heard say, be become so great devourers and so wild, that they eat up, and swallow down the very men themselves." Thomas More, *Utopia*

I have mentioned the kinetic control, but the outcome of a chemical transformation in the **long run** (although it is questionable whether modern history has a long run at all) is determined by the **thermodynamic control**.

I dislike the term thermodynamics if used outside exact sciences. It is perfectly valid there, but implies by its very sound that it is not. I don't see any more universally important knowledge than thermodynamics, however.

Thermodynamics tells what is going to happen in indefinite time, although it usually happens much sooner than eternity: the closed (isolated) dynamic system comes to the most stable state and shows no tendency to move from it. "Dynamic" means that there is a lot of motion in a system. Motion, in turn, means that there are moving components that interact with each other and exchange energy ("share food with poor strangers" sounds more human) until the total energy of the system comes to a minimum.

Thermodynamics of closed systems is of little use if we deal with large complex systems such as society, ideology, culture, technology and running events in them. They not only contain severe limitations on what can interact with what—USA and Iran are an example—but are also able to remain in unstable states for as long as they interact with a source of energy and matter. The Iraq war is another unfortunate example, devouring cannon fodder, fuel, food, and money, all duly dispensed from the rich nation of ours, so rich, that we do not even notice the war on our table.

The Iraq War is an excellent illustration of the kinetic versus thermodynamic control. It had been for some time victorious due to the kinetic effect, until the thermodynamic effect took over. A steady state of attrition is unfavorable for the West because of the incomparable advantage of the insurgents and the historically fatal catatonia of the politically split system.

> **NOTE**: Kinetics should not be set off against thermodynamics: everything is thermodynamics, but kinetics adds an additional—and quite commonsense—assumption regarding the transition state: nothing happens in an instant and something does not happen at all..

The second illustration of the generalized thermodynamics is the story of the collapse of the Soviet empire. The kinetic effect of the Yeltsin revolution soon ended with the gradual retreat toward the steady state of thuggish authoritarian policy. It may seem paradoxical, but Russia is today more thuggish exactly because it is more free and independent.

The reasons for the events in Iraq and Russia have not yet been convincingly researched, but they certainly have something to do with the unavoidable self-destructing side effects of power.

The third example is hypothetical: both China and India are in the kinetic stage and the prospects of the thermodynamic phase are more troubling for China because of its peculiar history, demographics, and power structure.

The fourth example is the history of nuclear energy in the West: kinetic enthusiasm, equally kinetic rejection, and the current stage of recognizing thermodynamic reality. Can we expect the renaissance of horse power? At least among the renaissanceniks?

The Internet could be the fifth story of the Iraq type: triumphal victory, unprecedented exposure to crime, attack, and abuse, and the long painful way toward thermodynamic safety (steady state of loss compensated by insurance), never fully ensured.

On Malthus, see **APPENDIX 3**
On the future, see **APPENDIX 4**

APPENDIX 1. **Things and humans**

Excerpts from **Essays** and publications in complexity

The New and the Different

NOTE (2006): With the exhaustion of energy, water, and soil resources, global society could be expected to scale down its freedom and complexity and enter the stage of involution. The recent slowdown trend in population growth and the prospect of depopulation reveals a counteracting factor. This rises the question of future global and local social patterns in the world where human creations compete with humans for resources in the increasingly dehumanized world. (p. 439)

The Rusty Bolts of Complexity: Ideograms for Evolving Complex Systems

I personally believe that today man-made things are the dominating component of the new civilization, money shines as the eternal Sun, and the human being is more faber than homo, more enzyme than DNA. If the resources of mineral fuel are depleted, sun-powered Things have an evolutionary advantage over heavy, errant, and voracious humans who, with their liquid-filled heads, will remain as a source of chaos necessary for further adaptation through mutating social DNA. Biosphere, formerly dominated by life, then by social life, then by exploding ideas, turns into technosphere (p. 44).

The Visible Hands: Homo Faber and the Chemistry of History

I prefer a version of Darwinism in which selection through local mutations and global homeostasis of the entire system (punctuated equilibrium) are complementary and inseparable. As a momentous example, local decisions lead to the global decline of the birth rate as result of competition between children and things:

> "Cars and children share at least one thing in common: they are expensive, particularly so in urban surroundings." B. Wattenberg, Ben J. 2004. Fewer: how the new demography of depopulation will shape our future. Chicago: Ivan R. Dee, p. 31

Essay 4. On new overcoats

All this techno-life (Technos, as I would call it) had to be fed with energy, installed, inspected, repaired, disposed of, and exchanged for new and improved species, genera, families, etc., as well as advertised, promoted, sold, insured, and defended from the competing species, genera, families, etc., and provided with well paid, qualified, educated, healthy humans to run all that. Moreover, science and industry could now manufacture and package human health in quantity and quality unheard of before. That was a product of unlimited demand, so that more qualified, educated, etc., etc., ... to oversee species, genera... etc., etc.

While Things raised productivity—which has been a major justification for their invasion—they acquired a remarkable property of brevity of life. Each new invention and improvement made them obsolete within time essentially shorter than human life. Old Things had to be dumped because old age became a liability for both humans and new Things. The Things lost their traditional resale value. Some very old Things went up in price, but only if they had been practically extinct.

Essay 6. On the Yahoos, or Apologia of Samuel Butler

I do not believe in any Luddite assault on technology. I believe, though, in the war of humans against the species of technology that take away their freedom and privacy, the war in which humans are the most likely losers. I believe that we live in times of a starting divergence between the evolutionary branches of man-made Things and humans. Divergence means competition.

Emerson, unlike Butler and all subsequent detractors of technology, did not mean technology per se, but the Things in general, i.e., the objects of manufacturing and exchange. This seems the most general approach to the evolution of a society that is not exclusively human anymore. By the Things I mean everything for sale, including cars, food, hotel services, movies, government (meaning not corruption but the fact that we pay for it), and even ideas that are becoming Things because of ever widening concept of copyright. Even our personal data and preferences are becoming Things for sale when we disclose them to companies in exchange for some miserable benefit.

Humans legally represent Things, like the abolitionists represented the slaves, parents represent children, and special interest groups represent whales, redwood trees, guns, breast, and colon.

Essay 32. The Split

My general point of view is that the biological evolution is not sufficient to cover the entire evolution of humans. Someday we will have to add Technos (Things) to the evolutionary tree of civilization and, at some point, to record the split between the humans and the Things.

In other words, we can anticipate a new powerful tree of Technos branching off the three of biological life at the point of appearance of humans. The entire tree of evolution will suddenly change its meaning. Biological life will be perceived as just one form of meta-life.

Essay 34. On Loss

Imagine a space traveler who came to Earth from another Galaxy to compare his/her/its observations with those of another traveler who had visited the planet 3000 years earlier. The major observable change would be an immense expansion of all earthly man-made Things.

For the last ten thousand years, the humans have not acquired an extra eye or finger. The evolution of their Things, however, has been explosive.

Technos has populated the Earth in an insect-like abundance, but with much more variety. The kingdom of Things ranges from the pyramids and the inimitable cathedrals made of stone—the oldest and largest survivors—to countless copies of the same design, for example, paper napkins. Technos supports a huge taxonomy of hierarchically arranged species, genera, families, orders, classes, phyla, kingdoms, and domains. Its abundance has been recorded in books, paintings, and films, which are also Things, as well as in the existing Things and old Things kept in museums.

Essay 40. Through the Dragonfly Eye

The ideology of Communism, therefore, was only a derivative of the ideology of production. It is a very unsettling idea.

The Soviet industrial machine was a lousy, inefficient, and bleak prototype of the future, a macabre toy of evolution. Its very poverty, however, was a solution for a scenario of depleted resources of energy.

Heavy, fleshy, vulnerable, gluttonous, hedonistic humans, who need food and water, have no chance in competition with the chips subsisting on solar energy, even if they engage in sex from dawn to dusk, clone themselves by hundreds, and combine it with watching the silicone entertainment. The billions will have to die, like the billions of acorns falling from the oak trees, of hunger, thirst, and war: before the birth.

The Pandora box of industrial growth, to which we owe our freedom, wealth, and comfort, seems to be one of a few (if not the only one) really new, new evolutionary drawers. In fact, it is part of a more general drawer of biological growth. Life is growth through replication and it leads to competition, and competition leads to evolution. A population or a large taxonomic unit (species, genus, family) may survive for a long time because it is not a single organism. A tightly built social mechanism with only one brain, heart, and blood circulation is doomed as any single organism. This is why the **single** Soviet social organism died, spilling its genes into a pile of rusty but enthusiastic little screws.

Essay 42. Credentials and Credo

The things (i.e., Technos: life forms based on technology instead of biochemistry) may have an evolutionary advantage over wasteful, expensive, and prone to malfunction humans. When humans and things begin to compete for resources, the situation may resemble a version of the war of the worlds.

> With modern digital technology we have created an invasion of unusual aliens. Things and us are moving toward the joint digital genetic code but still have different means of its expression. As result, we, humans, are becoming more thingish, programmable, intellectually downsized, standardized, reined in by debt, and controlled, while things become more human, sly, devious, and they develop their representation in the government. The US Government represents things and humans, while the ratio of priorities constantly moves toward the prevalence of things. At the same time the tribal societies fuse humans with weapons, creating the most apocalyptic approximation of the invasion of aliens. The old European societies are under the double pressure from both.

Essay 46. Postmodernity: Postmortem for Modernity

We are a symbiotic life form. In this sense we are similar to lichens consisting of fungi and algae or some crabs living on a mollusk shell. We remember ourselves as homo sapience since we started using tools and fire.

We are the talking and manufacturing primates (Homo faber) in symbiosis with technology. For about a century, but especially in recent decades, this symbiosis has been increasingly turning into a fusion, at least in the West . We are as inseparable from technology as the crab from its shell. In America, we cannot exist without a car, except in the cities, and we cannot even give natural birth in 30% of the pregnancies. Medicine develops into maintenance and repair engineering.

In most of the world we procreate less and less, given the choice between children and less demanding and ostensibly subservient products of technology. The things multiply incomparably faster than humans. They use a digital code, which is a counterpart of organic DNA, and do it in more efficient ways than we who are unable to function without daily food, water, and night sleep.

The things obliquely vote in elections, without going to the polls, and citizens can forgive the government anything but the collapse of production that sustains them. This is what we consider the twentieth century civilization and the postmodernity is in no way different.

Initially an extension of animal limbs, technology has been moving closer toward the classical biological kingdom. Domain could be a good term for the four levels above kingdom—life, society, Technos, and ideas—for which the reproducible and convertible into digital form codes exist.

The species of Technos—from a toothbrush to the giant EMS Queen Mary 2—have acquired a digital code, similar to RNA and DNA of biological forms. Not only the clones can be expressed (brought to existence) from the coded message at appropriate conditions, but also mutants and recombinants. Moreover, many aspects of human behavior can be codified in a digital form, as in the infamous US Tax Code, the Queen Mary 2 of American bureaucracy.

The natural hereditary codification of behavior is an ancient biological feature, which in humans took a new form as the laws of Hammurabi, Bible, Talmud, Confucius, and Koran. Separated from human bodies and put on stone tablets and paper, some of the codes engaged in an independent and vigorous evolution, while others have been dragging their feet.

The digitized technology, previously completely controlled by human minds, moves toward more independence and even competition with humans. We depend much less on the weather than on the stock market indexes. Our life runs under the despotic ticking of the clock and the menace of the neo-Hammurabi codex of schedules and contracts with severe punishment for a breach.

Essay 51. Potato as Food for Thought

I regard man-made Things as a new big component of the system called planet Earth. Technos, or technosphere, in the Vernadsky tradition, is thought to be brought to existence by human desires.

I see in Technos a new super-kingdom of life or, to be more exact, a separate evolving complex system, on par with living organisms and human society. I am sure that today Vernadsky would separate it from the noosphere, but he died in 1945.

As animals diverged from plants and humans later diverged from animals, the things have been diverging from humans since the appearance of digital code, the thingish equivalent of genetic code.

Here we come back to Michael Pollan, a writer with interests comprising a very big chunk of EVERYTHING. I believe that Things use humans as much as humans use Things. I believe they desire each other as much as plants and humans. They can also hate each other. I believe that the belt of the suicide bomber is the killer as much as the

bomber himself. More important, Things can compete for resources, and not just space, energy, and matter: the most strained and hopelessly limited resource in our times is time itself.

I believe that the Things with stored digital blueprints are the newest really big historic evolutionary cigar- , peapod-, lens-, or torpedo-shaped trend after the Industrial Revolution (Figure 13). They have been moving to the same position of domination that the humans are used to in relation to organisms and things. They take good care of those who takes care of them. They are our gardeners.

APPENDIX 2: **Vladimir Vernadsky**

Excerpts from *Biosphere and Noosphere*,
http://www.21stcenturysciencetech.com/Articles%202005/The_Noosphere.pdf

1.

The younger contemporaries of Darwin, J.D. Dana (1813-1895) and J. Le Conte (1823-1901), both great Americans geologists (and Dana, a mineralogist and biologist as well) expounded, even prior to 1859, the empirical generalization that the evolution of living matter is proceeding in a definite direction. This phenomenon was called by Dana "cephalization," and by Le Conte the "psychozoic era."

2.

Here a new riddle has arisen before us. Thought is not a form of energy. How then can it change material processes? That question has not as yet been solved. As far as I know, it was first posed by an American scientist born in Lvov, the mathematician and biophysicist Alfred Lotka.

.....

At present we cannot afford not to realize that, in the great historical tragedy through which we live, we have elementally chosen the right path leading into the noosphere. I say elementally, as the whole history of mankind is proceeding in this direction. The historians and political leaders only begin to approach a comprehension of the phenomena of nature from this point of view. The approach of Winston Churchill (1932) to the problem, from the angle of a historian and political leader, is very interesting.

.....

Now we live in the period of a new geological evolutionary change in the biosphere. We are entering the noosphere. This new elemental geological process is taking place at a stormy time, in the epoch of a destructive world war. But the important fact is that our democratic ideals are in tune with the elemental geological processes, with the law of

nature, and with the noosphere. Therefore we may face the future with confidence. It is in our hands. We will not let it go.

3.

In my own scientific work the First World War was reflected in a most decisive way. It radically changed my geological conception of the world. It is in the atmosphere of that war that I have approached a conception of nature, at that time forgotten and thus new for myself and for others, a geochemical and biogeochemical conception embracing both nonliving and living nature from the same point of view.

4.

The noosphere is a new geological phenomenon on our planet. In it for the first time man becomes a large-scale geological force.

.....

Here a new riddle has arisen before us. Thought is not a form of energy. How then can it change material processes? That question has not as yet been solved.

See also:

http://www.larouchepub.com/other/2005/site_packages/vernadsky/3207bios_and_noos.html

and: Irina Trubetskova, *Vladimir Ivanovich Vernadsky and his Revolutionary Theory of the Biosphere and the Noosphere,* http://www-ssg.sr.unh.edu/preceptorial/Summaries_2004/Vernadsky_Pap_ITru.html

In post-Soviet Russia Vernadsky has acquired a utopian cult status, blessed by the authoritarian government. It reminds me of the status of Marxism in Soviet Russia: secular promise of salvation from this world's misery.

On Russian attitude to Vernadsky, see: http://www.vernadsky.ru/Noosfera/Noosfera_14_engl.pdf , where the article by G.B. Naumov, *"Noosphere" by V. I. Vernadsky*, p. 40, contains an insightful analysis of his main idea.

> For Vernadsky, formal definitions were not plausible. He rather tried to explain the essence of notions he used in his works than to formulate a single definition. As a result, in different contexts one and the same term could acquire different hues of coloring, emphasizing one aspect of its meaning or another. (G.B. Naumov).

This is something I like.

APPENDIX 3. Malthus today.

Three corrections could be made to the thesis that population will outrun food supply:

1. Population means humans and their things (or things and their humans).

2. Food means fuel (nutrients and energy) for population.

3. Species of population do not necessarily increase (Darwin pays his debt to Malthus)

Whether the corrections are optimistic or pessimistic is hard to say.

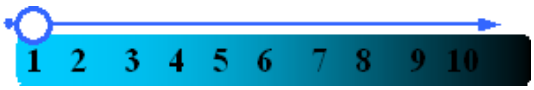
APPENDIX 4.

Part of advertisement of BASF corporation in *The Economist*, September 8-14, 2007:



2007

Essay 53. Power: Hidden Stick, Shared Carrot





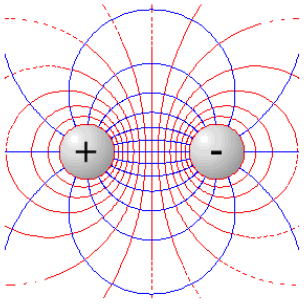
With the only remaining superpower in the world, the hue and cry about the power of corporations, the swelling power of money in politics, and the powerless occupation of Iraq, it is appropriate to ask what power means outside physics.



We all have intuitive images of power in social, economic, political, and even intimate context. Trying to fish out a definition of power from the Web, I quickly found that it ran through Google's colander in hundreds of trickles. The concept of changing technologies of power (Michel Foucault) was the only solid chunk that under circumstances could pass for a golden nugget, but Foucault himself, as befits an oracle, was not solid on anything. The oyster shell of his famous motto about power "old right to kill and let live was replaced by a power to support life and let die" *(qu'au vieux droit de faire mourir et de laisser vivre s'est substitué un pouvoir de faire vivre et de laisser mourir)* falls easily apart into " support life and kill" and "let live and let die" under the knife of analysis and some, myself included, find it empty. The opposition is just not true, starting at least with Hammurabi. And who but Communists/Fascists and anti-Communists/anti-Fascists could be solid, regarding the chaotic torrents of the twentieth century? Both C-s and F-s, by the way, wanted to make die as much as make live. One was just the way to the other.

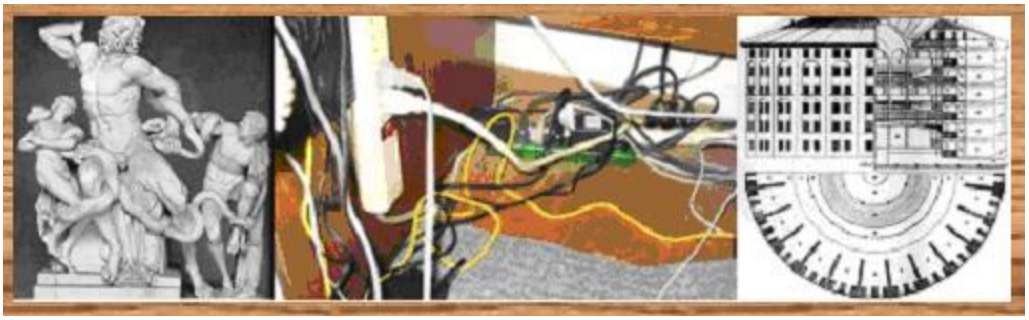


Historically, the social power has always combined two ultimate forms: stick in one hand and carrot in the other. Michel Foucault gives not a hint of evidence of an evolutionary change from sovereign power (portrayed with scepter and orb, see on the left) to the "bio-power" that is a kind of omnipresent electromagnetic field, which, actually, could be its good symbolic representation (see on the right). Regarding "kill," Iraq War is a case to consider, but not here. All kinds of power coexist today in the world and even within the same country.



I cannot think about power without its unambiguous source. There is no power of money without its owner, whether individual or corporate. Even within a corporation it can always be traced to a desk and a name.

Michel Foucault and Giles Deleuze sensed the radical change in technology of power that was coming with wired capitalist democracy. By the end of their century, the change would become obvious with the Panopticonic loss of privacy (and sleep) and Laocoonic entanglement of individuals in wired and wireless connections (there is a real snake pit of wires under my desk, **see below**). Many people had bad dreams about technology even before that time and many still have.



The snake pit (center) with Laocoon (left) and Panopticon (prison, right).

How a powerful leader comes to grips with a flood of information? He brings his adopted sons and daughters into his staff to share the snakes' coils.

My first and only impression of Foucault is that of ultimate triviality of his parallel vision of the world, which I am inclined to compare with the vision of Plato's cave dwellers. The real world (together with natural sciences and observation of facts) remains outside. Instead, the cave dwellers develop mythology and epic poetry. What he calls power I see simply as organization: introducing order into chaos by creating and breaking bonds.

With all still ongoing technical arguments about Foucault and with all my personal revulsion to his style of secular preacher carried away by the ability of words to combine into a going in circles beadwork (I have just crafted a short fragment of the beadwork), I consider him prophetic because he was vague but insistent in attributing some biological attributes to the historical change. When he used the term **bio**, however, he meant biology in its traditional meaning of life of **known** organisms and species.

Giles Deleuze and Felix Guattari shared the same gravitation to biological imagery (rhizome etc.), as well as to the verbal compost on which a whole generation of interpreters could grow the mushrooms of arguments.

Thomas Hobbes and Werner Heisenberg , separated by a great distance in time, represent a different, much more imaginative type of prophets who saw society as a

consolidated and constrained organism. Life and organisms were for them, in modern terms, **meta-life** and **meta-organism**.

I cannot accept any social and political power that is impersonal and invisible and, along Foucault, comes from everywhere. Whether a carrot or a stick is held by a hand, personal or composite, we can seize this hand by the wrist, all the more, when the hand signs a check.

I believe that the direction of the flow of history has already become streamlined enough to start a systematic inspection and reappraisal of our most abstract notions stored at the top shelves of the knowledge attic. We sense the long-run course of history when we change dictionaries and textbooks for more recent ones, as we sense the short-run course of life while discarding telephone directories, but when paper itself becomes a cumbersome option, we may sympathize with dinosaurs.

What exactly is this direction? We instinctively feel its diffuse starting point within the last quarter of the twentieth century, but need another one to draw a line. As it is common in history, we need the next turn to close the chapter, to pin the past to cardboard, type a label, and put it all under the glass cover of a display case. But then it is too late to do anything but erect memorials.

I am unable to excavate even a thin layer of all rocky literature on power. Here is my own sketch of the subject, which I am trying to draw on water, with Thales of Miletus in mind.



As a chemist, I am spoiled by the great—but not unlimited—**power** of chemistry to manipulate the natural course of molecular events. I even think that Michel Foucault could see chemistry as the purest embodiment of impersonal "biopolitics" designed to deal with masses instead of individuals, if only chemistry did not look so arcane to most normal people. I have never thought about this ability of science in terms of power, other than metaphorically. Power implies that a **measure** of this ability exists and there could be **more** power or **less** power.

In the modern scissors-rock-paper game, money buys knowledge, knowledge grows power, power pulls money. The wheel of fortune, as any metabolic cycle, spins in one direction. The real socio-political power, apparently, belongs to the leaders of the nations, movements, and corporations with above a certain number of digits after the dollar sign.

The power of an experimental scientist can indeed be compared with political power: it starts with an idea. Francois Jacob, one of the creators of modern biology and as much poet as scientist and soldier, wrote in his *The Statue Within* (one of the most memorable books I have ever read)

> Contrary to what I had long believed, the process of experimental science does not consist in explaining the unknown by the known, as in certain mathematical proofs. It aims, on the contrary, to give an account of what is observed by the properties of what is imagined. To explain the visible by the invisible. (Francois Jacob, *The Statue Within*, Basic Books, NY, 1988, p.288)

We do not experiment on history: history experiments on us. But we still need imagination to understand the results.

In science, as in politics and business, the cost of a good new idea is often just the cost of a cup of strong coffee. What makes chemistry and politics (as well as the physics of high energy) so different is the cost of the validation of the idea.

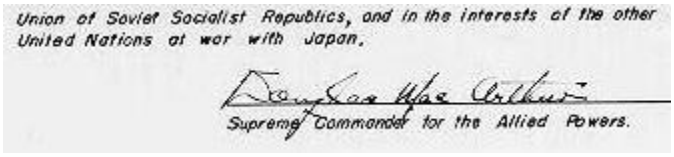
Chemical experiments today, especially in organic synthesis, where the creative power of chemistry is most visible, do not require, as a rule, any exorbitant expences. But with the border between American politics and business more porous than the US-Mexican border, a cup of coffee and a vote will not suffice to do politics. Chemistry, together with the rest of the academic world, hastens to secure a double citizenship, contemplating the benefits of both.



As somebody with a double background (but not double allegiance) of Soviet totalitarian system and American democracy, I have my own vision of what makes the new period of history so different, at least in America. After centuries of the Western emancipation of the individual and masses from the violence of sovereign power, driven by the rise of commerce and by Industrial Revolution, the new trend, driven by the same forces of commerce and technology, is reversing toward the absorption (incorporation?) of both the individual and the masses into a dense single system. Society consolidates into a single organism in which no part has a complete autonomy and every cell is involved in the same metabolism of money—the energy carrier of evolving complex systems.



As a rule, there is neither a single stick nor single carrot in the new life-like systems. What still remains from the era of emancipation and decline of sovereign power is the signature, the recorded (on paper or electronically) mutual agreement of the sides, the contract, whether one or neither or both sides like it. A receipt in a store for a credit card payment



or in exchange for paper money, signed by the Secretary of the Treasury, represents the same kind of power as the Japanese Surrender Document, signed by Douglas MacArthur in 1945.

The signature is a product of a convergent evolution of stick and carrot: it is a hidden stick (punishment for breach) married to a shared carrot (expected mutual benefits, sometimes, just the least evil).

Power belongs to the hand that signs a piece of paper. Note, however, the great inequality of power between the random holder of $1 bill and the Secretary of Treasury, as well as between General Douglas MacArthur and the envoys of defeated Japan. Note also the volatility of the power: Robert E. Rubin is not the Secretary of the Treasury anymore, but the dollar is still valid, having lost some of its buying power, however. The military power of Japan, so great before Pearl Harbor, is minuscule, but not so long ago its industrial power made Americans worry.

In modern society money not only buys knowledge, but turns it into big business, some even say, commodity. Knowledge can be commodity by the same reason as corn and copper: it is just a string of 1 and 0 in a computer file. All ones and zeros are as indistinguishable as grains of corn and atoms of copper. A computer file has content but not form.

For an anti-symmetric reason, art today is also commodity: it has form but not content. Who cares what a piece of art is about if it sells?

> That Richard Serra is known as a **minimalist** who works with the **largest** known sheets of metal could be mind-boggling, but not in the postmodern world. I see both him and much brighter and likable Anish Kapoor as re-creators of Freudian urges of growth and size—in dimensions as well as cost—materialized from the deep Id of Leviathan. There is a fine deep similarity between them and the work of Foucault, Deleuze, and Guattary. Better means more—steelwork, beadwork, word work, bits, pieces, whatever).

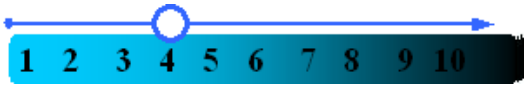
While philosophers may argue whether we are losing freedom (who knows what freedom is without knowing slavery?), we are certainly losing free lunch.

What is free lunch, then? It is the commons, the public sphere, which, by the way, is often provided and promoted by the least free societies in the world. It is free only in the sense that an individual has a free entrance to an all-you-can-eat joint as many times a day as he wishes. In politics, it is Hannah Arendt's public space, which today is nowhere naturally free.

Hannah Arendt, who in my eyes was the last modern solid thinker, just enough a poet to be a philosopher, and sufficiently vague to be an oracle, cut the Gordian knot of the power problem by separating it from violence. Her solution—to see modern power as contractual, i.e., the power of signature enforced by the cohesion of large numbers of people—has not convinced everybody, and me neither. My personal view is that she left

one important question unanswered: why is one side more powerful than the other when they exchange signatures?

And, by the way, with the alleged decline of violent power of the stick, why is our current bloody reality such a far cry of carrot cake? But I ignore this question here. Part of answer could be in sociobiology, after all.



The meaning and substance of power, freedom, and slavery is evolving. If we cannot blame and lament evolution, the consequence is striking: we have nobody to blame, not even the President. All we still can do is to praise whoever makes us happy, although happiness evolves, too. I believe this is the essence of the meta-biology of the Western world: the Leviathan is neither a person nor a god. It simply lives on, as any other creature. In this sense, neither Leviathan nor its organs and cells are free to desire: all they want is to live on and live well and live better tomorrow.

Growth is the universal obsession and what cannot be expressed in numbers is not growth. Against this hedonistic spirit, not only the Middle-Eastern militant and suicidal spirit, but also the murderous spirit of Fascism and Stalinism, which was the initial stimulus for all discussions about freedom in the last century, look most contrasting. What unite them is the attempt to do history on the cheap: to make die is simpler than to negotiate a contract, make live, in terms of Foucault.

A separate metaphysical question: is the modern good-natured Leviathan self-destructive? And is it good-natured at all? This is certainly not a chemical question. But there is a more specific question behind it: is any empire doomed? Intuitively, the main reason could be that any growth, after an explosion of creativity, is self-destructive, and so is human life, but why? As for less abstract political reasons, the simple reason for self-destruction could be the outsourcing of management of the unbearable complexity to external systems with dubious loyalty.

> **NOTE (2016).** An information technology corporation is such system. The conflict between FBI and Apple over encryption is the best example. The Internet of Things seems to be the next. Any corporation with the rights of an individual is more powerful than any individual.

It is not enough to declare that I am not a social critic and that I may argue with individuals, and may dislike the course of evolution, but not argue with it. It is not enough that the simple Buddhism-inspired idea of minimizing desires has been my personal ideal (never completely attainable, but never disappointing) for most of my life. As a chemist, I must notice something from my professional angle, but I have difficulty finding analogs of political power in the world of molecules. Nevertheless, as a chemist, I must see the world as a structure. Whether it is a molecular structure of Lipitor or the

administrative charts of subordination, is a combination of points and lines. I turn my attention to the few unique points in the structure of world power.



POWER EXHIBIT 1

Chrys Lydon on his excellent Radio Open Source uniquely complements and often rivals Charlie Rose on TV. This is what I saw, however, on the Open Source website:

Mary's Notes, June 14, 2007 We learned on Friday that WGBH in Boston has decided not to continue airing Open Source as of July. We are disappointed, of course, and surprised as well. To us the station expressed concern about our long-term funding and said that our program had not developed the Boston audience they had hoped for.

Public Broadcasting System (PBS) and NPR (National Public Radio) are an example of modern power relations. Their consumers are free to pay or not to pay, although NPR has no freedom of this kind. A tolerance of the Leviathan to this kind of anarchy is highly improbable. One of the saddest pictures of American life for me is the decline of PBS and NPR, and WGBH (Boston) in particular, where Antiques Roadshow and Suze Orman with her "Women and Money" let you hear the sweet jingle of gold almost every day.

See APPENDIX 3



POWER EXHIBIT 2

If somebody says that pharmaceutical companies rob the society and its ailing members, I would agree. The scientific mind most susceptible to a cup of coffee is not easy to find, but you need only a few of them. To deceive society, in politics as in business, you often need a lot of money and a small army of mercenaries.

Here is a fresh (2007) example. Sad-faced Dr. Robert Jarvik says in a huge ad of Pfizer: "I take Lipitor instead of a generic." But why? It is a fundamental law of chemistry that properties of **pure individual** substances or their mixtures of a defined composition do not depend on the way of preparation. A short search on the web could explain why Pfizer does not wish you well: the patent on Lipitor is about to expire. Meanwhile, Pfizer, contemplating the coming end of Lipitor, supports the scientific series of Charlie Rose, as I , already conditioned like a lab animal, was **almost** shocked to learn. To me this is one of many signs of the current trend, which, as Marcia Angell believes (*The Truth About*

the Drug Companies: How They Deceive Us and What to Do About It, Random House, 2004), started with Ronald Reagan. The borderline between politics and religion began to mexicanize by the same time. Today the double allegiance of biology in America to God and Darwin has been financially reinforced by the President in the name of a "higher authority."

For the sake of justice, I must say that the picture is complicated because all money, regardless of origin, circulates in the national and global turnover like water and oxygen. Like water and oxygen, it does not smell. The wonderful properties of money do not depend on its origin and ownership. I believe this is what makes Western societies and America in particular exceptionally stable. Nothing unites us more than money. Watch the French experiments with socialism.

What can end this stability? The growth of non-monetary values, such as religion and fanatic ideology. Alas, this is the great paradox of liberalism: it keeps us on the thrilling edge of self-destruction, but the only alternative to it is tyranny.

Pfizer ranked 24th in Forbes list of Fortune 500 companies in 2005 and 49th in 2002

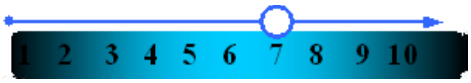
Table 1

Pfizer, Inc.		
	2002 ($ B)	**2005 ($ B)**
Revenues	**32.3**	**52.9**
Profits	**7.8**	**11.4**
Assets	**39.2**	**123.7**
Stockholders' Equity	**18.3**	**68.3**
Market Value	**251**	**194**

Pfizer, as we may suspect, uses its power to manipulate bodies and minds of very large numbers of suffering people with the single goal of increasing the numbers in the above Table 1.

I must emphatically deny having any competence in financial and business matters, but this incompetence is exactly what makes me a typical subject of big power.

I understand power as something that can be compared with another power on a scale. The purpose of this Essay is to formulate a measure of power.



POWER EXHIBIT 3

Next follow some data, I don't know how reliable, about concentrated power to sign checks and executive orders.

DISCLAIMER : By no means do I want to attach any moral judgment to the following data. As a chemist, I see the data as concentrations of components in a mixture and I am interested only in the further direction of events. Neither do I denounce Pfizer Inc. (which I may only as a molecule of the mixture). Neither do I denounce capitalism and concentration of money because in order to do that I need something better as a reference point and I have no idea what it can be.

Table 2

The richest people in the world ($ B)			
	2001		**2006**
Bill Gates	**58.7**	Bill Gates	**50**
Warren Buffett	**32.3**	**Warren Buffett**	**42**
Allen, Paul Gardner	**30.4**	**Carlos Slim Helu**	**30**
Ellison, Lawrence Joseph	**26**	**Ingvar Kamprad**	**28**
Albrecht, Theo & Karl	**25**	**Lakshmi Mittal**	**23.5**

Table 3

MILITARY BUDGETS, 2006, $ B					
Rank	Country	Budget	Rank	Country	Budget
1	United States	419	9	South Korea	24
1a	United States, 2008	644	10	India	22
2	China (2006)	122	11	Brazil	16
3	Russia (2005)	59	12	Italy	16
4	United Kingdom	55	13	Australia	15
5	France	45	14	Canada	14
6	Japan	41	15	Indonesia (2006)	10
7	Germany	36	16	Netherlands	10
8	Saudi Arabia (2005)	25	17	Israel (2005)	10
Parentheses indicate actual spending					

Table 4

US Federal Budget, 2007, $ B			
Social Security	**586**	**Administration of justice**	**44**
Defense	**699**	**Natural resources and environment**	**33**
Medicare	**395**	**Foreign affairs**	**33**
Unemployment and welfare	**367**	**Agriculture**	**27**
Medicaid and other health related	**276**	**Community and regional evelopment**	**27**
Interest on debt	**244**	**Science and technology**	**25**
Education and training	**90**	**General government**	**20**
Transportation	**77**	**Energy**	**1**
Veterans' benefits	**73**		

Table 5

Bill & Melinda Gates Foundation Report 2006	
ACTS OF CHARITY	$ B
Warren Buffet's gift , June 26, 2007	31
Endowment assets available for charitable activities, December 31, 2006	33
Liability for future year payments on already approved grants.	3.4
To address neglected diseases	0.115
GRANTS from inception through March 2007	
Global Health Including:	$7.8 B total
HIV, TB, and Reproductive health	1.9
Global Health Strategies	2.9
Global Health Technologies	0.47
Research, Advocacy, and Policy	0.8

Table 6

Humans on the Moon, cost	$ B
Apollo project, total	135
Apollo project, lunar module	11
Artemis project, first flight, estimate (1994 $; 2005 $: multiply by 1.3-1.4)	1.42

Table 7

War	$B
Iraq War, Total cost June 18, 2007 , 11:04	435,6
Vietnam War	549

Table 8

George Soros: philanthropy and politics **Promoting the values of democracy and an open society, B $**	
Annual spending	**0.4**
Total spending (by 2007)	**6**
Internet infrastructure for regional Russian universities	**0.1**
Support of dissidents in Communist countries, since 1979, per year	**0.003**
Anti-Bush campaign, 2003-2004,	**0.023**
Expenditures, 2004	**0.146**
Expenditures, 2005	**0.369**



When we have to deal with big powers, some bigger than others, we need a measure of big power before we actually approach it. **EXHIBIT 3**, in my view, demonstrates that the lower tier is quite commensurable with the upper club, taking to account that the upper tier, such as government, has a wider spread of goals and expenditures. In this sense—money per goal—corporations and even individuals can compete with governments and usually exceed them.

Power must be not just big, but concentrated. Concentration is a fundamental chemical factor. Concentration of power has also deeper physical and chemical analogies (**localization of energy**), which I omit here. Here is a non-technical illustration, perfect for our purpose:

> The second law [of thermodynamics] tells us about energy dispersal and entropy is the word for how that energy dispersal is measured — how spread out the energy becomes in a system, how much more dispersed it has become compared to how localized it was. Such energy changes and consequent entropy changes are the focus for understanding how and why spontaneous events occur in nature. Only sometimes do the structures or arrangements of molecules in an object help us to see greater or lesser localization of energy (that used to be called 'order to disorder'). (System: ice cube; surroundings: warm room.). **Source; t**his short web page is of universal relevance for simplicity hunters.

The liberal sword against corporations and inequality is double-edged: equality enfeebles and incapacitates, unless in intellectual exchange. The ice cube melts, which may be OK, but the hot coffee cools down, too, in the nondescript room of equality.

The tables in POWER EXHIBIT 3 illustrate a peculiar paradox of the power of money: big money is powerful only if concentrated on a small number of well-defined goals, best of all, just one. But if so, the big check is not needed: money can be supplied over time in a sequence of not so big packages. In this case, however, a social or political goal may completely change or lose relevance over time. Besides, grand money is usually wasted on grand scale. Some tables also imply that even big charitable foundations may generate just a sprinkle of money dispersed over small grants, but if they are spent over time on the same goal (as with tuberculosis), they might work perfectly well. The problem with long term financing, however, is that nobody is in a hurry. I think we have to accept the imperfections of our world. Intolerance is a form of perfectionism.

The power I am interested in is, i.e., the power of great power players, the big power, seems to be something that has no next level of power above it, like a king or a monotheistic god. It is the good old power of sovereignty, however limited and modified, without which we cannot win (or lose) a war and save (or sink) the nation.

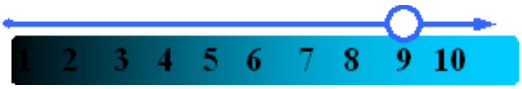
The sovereign power, that was prevalent for previous millennia of history, today, in the age of democracy, is limited in many ways. It is funny to see how a weak leader in the "most powerful in the world" position feels so naked without an upper floor above his office that he cynically refers to a "higher authority" directing his actions. Anti-symmetrically, the religious fervor of the American Right has been whipped up by strong leaders in the weakest positions in the world. God keep Jerry Falwell at his side and not let him return to earth.

That the Unites States is the only remaining superpower in the world is a cliché. Another cliché, "the rising power of China and India" makes more sense because it is measurable, justly or not, in hard numbers of production and wealth.

What does it mean to be the only top power of a kind? I see no sense in such statement. I can declare myself the most powerful man in my house—where I am the only man. We can say that a nation is stronger than another nation only if we compare them in a contest. The Iraq war and the War on Terror do not provide anything to prove that the United States is more powerful than a bunch of terrorists in Iraq, although intuitively we may not have a slightest doubt. Are China and India candidates for two more superpowers? Is the new money-drenched Russia, with its nukes, oil, gas, polonium, and political terror, another pretender?

There are big global players which are worlds in themselves: the United States and the European Union, two biggest and very different agglomerates of industrial democracy, of which the second one is still at the formative stage. Unlike India, China, and Russia, they consist of numerous powerful and largely independent subunits—corporations or *corgs* (corporate organisms, see **Essays 32** to **35** and **43**)—which form the lower tier of power.

The nature and actual distribution of power in the world is so crucial for the global future and such a complicated and dark topic that somebody must finally put the dog-eared Foucault aside and start the investigation of power form a clean slate. Not me, of course, but I wish to add my own contribution to the mess of the Augean stables before a Hercules comes.



The complexity of technology of power calls for a simple measure of big power. Since the big power does not have somebody else's penthouse on the roof of its corporate building, I suggest, quite intuitively, the following top-down measure of big power before it has actually been tested:

The highest power belongs
to the individual, corporation, or government

that can designate the largest sum of money
for a single goal.

> **IMPORTANT**: The outcome of a power contest (negotiations are also an instance of power contest) may differ from the expectation. This sounds like quantum physics, but this is because in the Big Power Club we deal with a very small set of contenders and contests, so that statistics does not work (and time series prediction makes no sense in history because of evolutionary novelty). What follows, by the way, is that a conflict between big powers in business as well as in politics means partly gambling.

Examples of goals: eradicate malaria, close national borders, win computer operating system market (Microsoft and Apple), become Number One in national education (even Number Three would do), build protection against terrorism, enhance democracy in Russia, establish the dominance of a certain political party for 50 to 70 years (sovietization? roveization?), etc.

Power, therefore, has no absolute measure, but powers can be ranked if applied to the same goal.

The problem with big goals, however, is that they may be impossible to achieve. But to achieve what is achievable (to buy a house, marry up, learn Chinese, travel to Machu Picchu) is not a matter of power but a matter of average wealth, desire, and, probably, some sacrifice. Power works against chaos and not against order and organization. Power, thermodynamically, brings into motion a social machine which can be quite ineffective, rusty, and wasteful.

The goal of big power is always an adventure. It is especially true about wars, whether hot, cold, trade, or social wars. This is because big goals always have uncertain future: history brings surprises. Only in few cases we know that the big goal is achievable in principle. In other cases we run an experiment, by definition, without precedent.

Big goals are especially wasteful because they often require a sequence of small steps that create bottlenecks to spending designated budgets. As result, spend now, ask for more tomorrow is a typical attitude.

Now I can feel some firm ground while attempting to justify the characterization of USA and former USSR as superpowers: both could designate huge sums of money for sending humans into space, and one could even send them to the moon. Both could spend huge money on wars and be defeated. Their ventures were initiated by way of signature. In this sense, the US President is the most powerful leader in the world. He can procure, control, and waste the largest sums of money in the world. By George, do we really want to be the only superpower?

Now let us consider the goal of roveization of America and turning it into a *de facto* one party system. Of course it had a good chance of success. It is my personal belief that the

reason why the goal was not achieved at that time (it still remains realistic and even more probable in the future) is that Karl Rove—or anybody else—could not put his signature under an appropriation bill to buy the best US President for the project. It was like filling up the Saturn V rocket in the Apollo Program with diet Coke. The fizz is over.

A pessimist would remark that any big goal is self-defeating, but if this were true, I would be extremely optimistic about the future of democracy. For comparison, the biggest of the Soviet projects, set by Vladimir Lenin and pursued by Joseph Stalin, to create a new (i.e., Orwellian) man, failed, too, although the biggest stick in the world was used for this purpose. True, there was a carrot of total abundance and happiness (otherwise known as Communist Utopia), too, but it was so far ahead in the future, always hidden behind next corner, that its aphrodisiac powers amounted to nil.

The more I think about the reason for the collapse of Communism the more I see it in a sudden realization of the Soviet ruling class that they did not need to wait for the future to achieve fabulous prosperity.

If George Soros hired a man who could think day and night how to dislodge the President and gave him billion dollars, he probably would succeed. But the same could be done by a determined Republican against the best Democratic President in history.

My modest discoveries up and down the billion dollar scale reveal to me the deadly efficiency of money in American elections. The data on cost of elections can be found in publications of The Campaign Finance Institute , for example (2004):

> Jon Corzine (D- N.J.) spent $63,209,506. Hillary Rodham Clinton (D-N.Y.) spent $29,941,194. The remaining Senate winners in 2000 spent an average of $4,737,365.

Even hundred million dollars is a relatively modest sum on the national scale. But nothing can be more focused than the election campaign: just about one person. Then why $23 million of George Soros did not do the job? Because the presidential campaign of 2004 was about at least a quarter billion dollars. This is, of course, a very rough simplification of the actual electoral mechanics because geniuses that think day and night on a problem are rare and do not form a statistical ensemble. Political life is a game with just one bet.

Today the deadly stick is in the hands of Islamic terrorists. The great modern conflict is in part caused by a huge difference in the cost of human life in the totalitarian and democratic societies: depreciation in the former and bubble in the latter. The sides cannot come to a handshake until the currency exchange rate is agreed upon.

America is still seduced by carrot cakes. The smaller the carrot cake, the more attainable. Not pie in the sky, but a carrot cake for everybody. While it still works—and I believe it still does—the American idea that you can have a bigger cake than your neighbor, is quite sound.

Money is power, for better or worse, and I do not believe that for worse only. I do not have any egalitarian ideals. Chemical reactions run in a preferred direction only because the instability (i.e., energy) is distributed very unevenly over the atoms of reacting molecules. Yet the growing inequality of power in the global and national contractual society, which is taking shape right before our eyes, begins to test this idea. From Manmohan Singh to Zbigniev Brzezinsky (well worth googling), a few very different people who combine wisdom and personal experience with power express doubt in the hedonistic worship of the carrot cake. They probably know well that the price of human life fluctuates on the markets of history and any general trouble brings all stocks down. Somebody will come and just take your cake away, together with your life.

What instead, then? A global auction for homo sapience? A topic for a future Essay.

The only power that can compete with money is the power of idea. Why? Because money is number and number is just an idea, too. This direction of discourse might be productive in the analysis of the Iraq War phenomenon in which two very different currencies of human life are involved in the trade.

Life does not play the scissors-rock-paper game. It plays money-love-death game, in which there are no rules.



APPENDIX 1

QUESTIONS:

1. What is the phenomenon of Heidegger, Foucault, and Deleuze-Guattari (or, for that matter, modern art, which is as impossible without a symbiosis with middleman as postmodern philosophy without cult promoters) from the point of view of a chemist? Think about the phenomenon of catalysis.

2. The term "War on Terror" (or, for that matter, war on poverty, drugs, and crime) sounds like an acknowledgment of respectability of the enemy. What exactly is the power distribution between the USA, Europe, and terrorism?

3. Has American power been diminished or increased by the presidency of George Bush? Or it just seems so? Same question applies to Russia and Putin.

4. Does my definition of power mean that the power of vote in democracy is nonsense? Quick answer: yes, the outcome of an election today is the outcome of the wrestling contest of big powers. Of course, the Republicans may have more power in terms of money. But they also have a bigger goal.

APPENDIX 2

I believe that Foucault's Panopticum is not quite up to date. With the following composition I express the spirit of the post-postmodern Panopticon in which the individual is formally free, but actually imprisoned by the Internet cubicles of the crooks, predators, and respectable companies craving for his individuality (called today **identity**) in order whether to steal or sell. It is the presumption of freedom that locks the prison.



David in the F-house of Stateville prison, Joliet, IL

APPENDIX 3

UPDATE 1 (*Lupus in fabula*):

FROM: http://www.radioopensource.org/

In House | Chris, June 27th, 2007

This is not the news we ever dreamed of posting.

After tomorrow's broadcast we are putting *Open Source* on a summer hiatus. We learned late last week that a brand-name media company that had asked to partner with us had changed its mind. So for now, the best hope on the near horizon of relaunching the program and refinancing it has gone aglimmering.

Without a substantial new funder, we cannot keep paying our bills. Your help and support has helped bridge the cost of production these last six weeks and helped pay some of our debts. For now the most responsible thing seems to be to regroup and think realistically about a new program for the fall.

We are actively dedicated, all day every day, to the essential mission: seizing the epochal opportunity of the web to stretch the public conversation… to hybridize media, to enlist the audience, to extend the palette of colors in the cultural as well as the political conversation; in short to democratize and globalize one model forum of constructive talk for the new century.

UPDATE 2

Radio Open Source is back! I quote:

> The summer is over, and so is our hiatus.
>
> The Open Source conversation is reborn at the Watson Institute at Brown University.

2016: http://radioopensource.org/

2007

Essay 54. Growth and Anti-growth



PART 1, INTRODUCTORY, repetitive, and skippable

1. STARTING FROM AFAR: Montaigne, de Tocqueville



In 2001, I intended my first *Essays* as a distant echo of Michel Montaigne's *Essays* (1580). My own Essays (i.e., attempts) were supposed to reverberate in the freshly internetted halls of the **New World**, the term which in times of my youth was still synonymous with America. The halls are so big, however, that the e-sound could travel bouncing off the walls for decades before coming back to me. Meanwhile, I keep sending signals.

My primary subject is the large-scale novelty of the contemporary world and the fate of freedom in it, as seen by a newcomer transferred here from the extreme non-freedom of the totalitarian Soviet society. I wanted to borrow from Montaigne not

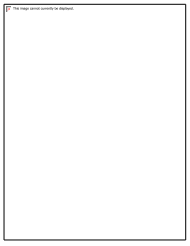
his comprehensive openness regarding all aspects of his personal life, but his absolute freedom of reflection, including digressions, ramblings, and countless quotations.

Very early in my childhood, *The Mysterious Island* by Jules Verne (**Essay 50**) was my first and most powerful intellectual stimulus. Some incomprehensible pages of the book described chemical processes: making iron, soap, sulfuric and nitric acids, and nitroglycerin. I became a chemist. Much later, Montaigne became my first teacher of freedom by affirming individuality as its very beginning. For the rest of my life I have been a too much of individualist for my own good. Montaigne's *Essays* was one of the three most formative books of my youth, two other being *Dhammapada* and Henry Longfellow's *The Song of Hiawatha* in a great Russian translation by Ivan Bunin. One introduced me into blind principles and the other into true poetry.

Hiawatha expanded my understanding of poetry beyond rhymed lines. Chemistry, at an even later stage of my life, opened to me a window through which the world as a whole could be seen and partially understood in terms of atomism and structural transformation. Poetry, science, unbound reflection, and **blind moral principles**, all coming from my early impressions, are the performing quartet of the collection at spirospero.

Alexis de Tocqueville noted in *Democracy in America*:

> Men who live in democratic communities not only seldom indulge in meditation, but they naturally entertain very little esteem for it. A democratic state of society and democratic institutions plunge the greater part of men in constant active life; and the habits of mind which are suited to an active life, are not always suited to a contemplative one. (Volume 2, Chapter X)



For eight last years of my life in Communist Russia I had no access to professional life or any employment and my activity for long periods of time was spent in defiant inactivity.

I had come to America with a deeply ingrained habit of reflection. Thinking was my hobby. I was happy to reach the point when it finally became affordable as my major activity, peacefully competing with going to the beach, tending to tomatoes, and fixing the porch. Luckily, by that time Internet was ready to accept anything bottled into a file and tossed into its muddy e-waters.

I need this introduction to explain the origin, style, and direction of my casual **Essays** and somewhat more focused and substantial pieces in complexity because I am approaching very serious and intricate things in which the border between complexity and simplicity, as in all serious matters, disappears. This has always been my main intent and enjoyment, but by counting on minds both active and contemplative I most likely sentence my bottles to perpetual virginity. Indeed, exploiting the incomparable eloquence of Alexis de Tocqueville,

> Everyone [in America] is actively in motion: some in quest of power, others of gain. In the midst of this universal tumult—this incessant conflict of jarring interests—this continual stride of men after fortune—where is that calm to be found which is necessary for the deeper combinations of the intellect? How can the mind dwell upon any single point, when everything whirls around it, and man himself is swept and beaten onwards by the heady current which rolls all things in its course? (Alexis de Tocqueville, *Democracy in America*, Volume 2, Chapter X).

One way to find the calm is just to launch one's mind into the whirlwind instead of focusing on the single point, only that single point should not be money.

> Amongst a multitude of men you will find a selfish, mercantile, and trading taste for the discoveries of the mind, which must not be confounded with that disinterested passion which is kindled in the heart of the few. A desire to utilize knowledge is one thing; the pure desire to know is another (Alexis de Tocqueville, *Democracy in America*, Volume 2, Chapter X).

The powerful currents of American life, so contrasting with the pictures of deceitfully drowsy and prostrate suburbs, impress me much more than Niagara Falls. But what is that heady current and what is its course? It is **growth**, the universal property of life and all evolving complex systems (X-systems) growing on life. The subject of this Essay is growth from the point of view of a chemist, and if there is growth, anti-growth must be nearby and, probably, growing, too.

2. COMPOSITION IN SAND AND GRAVEL: making fool of myself



Faith and reason do not mix. Neither do poetry and science. I still do not know what is immiscible with the Web except warm human touch. Reflection, however, like a glue (or money in economics), embeds poetry, science, and belief into a kind of composite material, in which components do not mix, but just tightly stick to each other, like cement, sand, and gravel in concrete, bones, vessels, muscles, and nerves in an organism, and, I guess, supply, demand, and price in economy.

While reading (superficially) Michel Foucault very late in my life, I felt baffled by a new and unfamiliar—except for a few previous encounters—kind of literature, rarely readable, but portentous (in both meanings of the word). I would put it into a broad category of **search for the shifting borders** between the four domains: poetry, science, reflection (or philosophy, if reflection is too obscure), and blind moral principles. I was also surprised to find that all subjects of Foucault's investigation could be seen as **economics**: of sex, madness, medicine, knowledge, power, state, and ideology.

Philosophy used to be about the sublime, economics is about the gritty. With Foucault and Heidegger, philosophy falls face into dust.

Economics, which I instinctively distrust for setting diverging goals, is the largest white spot on my own mental map. But if everything is economics (in the lives of most Human Americans, I believe, it is) how can I understand the world around me without economics? Some encouragement (bold font is mine) comes from Erwin Schrodinger:

> We feel clearly that we are only now beginning to acquire reliable material for welding together the sum total of all that is known into a whole; but, on the other hand, it has become next to impossible for a single mind fully to command more than a small specialized portion of it. I can see no other escape from this dilemma (lest our true who I am be lost forever) that some of us should venture to embark on a synthesis of facts and theories, albeit with second-hand and incomplete knowledge of some of them—and **at the risk of making fools of ourselves (** Erwin Schrodinger, What is Life).

I have no problem with taking this risk, but the above quotation points also to a different matter.

Erwin Schrodinger was not interested in grand theories of everything. He looked at the phenomenon of life from a narrow, purely physical point of view, but addressing the widest audience. He was even criticized for his vulgarization of an important physical concept of entropy, to which he resorted in order to avoid technicalities. As result, he was the first to answer, as early as in 1944, some most general questions about life in a manner that helped James Watson and Francis Crick to search for more intimate molecular details of life. In my opinion, Erwin Schrodinger also formulated the most general principles of all Evolving Complex Systems (exystems).

I do not believe in grand theories of everything and for a very simple reason: everything evolves and our knowledge of everything perpetually lacks something we have not even a hint what it could be. A theory of everything is a contradiction in terms. While physical world changes negligibly, if at all, during the human presence on earth, human history is a record of new and unanticipated events. What we can do is to explore borders between the certain and the possible, as well as the expected and the astonishing. We cannot predict the future, but where does the future start? We cannot know the unknown, but where does the known end?

Unlike physics, chemistry views the world as transformations of atomic objects selectively connected with bonds. This is certainly a very narrow slit to look at the world. But what we can see through it cannot be seen from other observation points. Regarded in this abstract way, chemistry is just a field of unusual mathematics, and Ulf Grenander created this field (Pattern Theory) single-handedly. I was powerfully influenced by Pattern Theory, but I will remain here as just a chemist, which is my nature. I will not speak about chemical formulas, however, except for a single trivial incidence.

Chemistry is deeply pictorial because it is about the **imagination space**. Most of what we see with chemical eyes can be presented in **silent** pictures consisting of points and lines. How can we describe them in human voice? We are constrained by logic, but the choice of words is ours: we **compose**. This is why, thinking as a chemist, I do not want to limit myself to any verbal or visual palette. I am willing to make fool of myself.

I will come back to anti-growth, but for growth we need to rub shoulders with economics, the most unorthodox, but least inviting subject for me after orthodox religious faith.

PART 2 ECONOMICS , the new science of everything

3. EVERYTHING IS ECONOMICS: from economics to economics of economics

Regarding the subject of growth, outside natural sciences we have only one source: economics. But what is economics? How vast is economics? **Google, August 7, 2007** : about **156,000,000** for **economics**. For comparison, about **104,000,000** for **chemistry,** about **117,000,000** for **biology**, about **110,000,000** for **humans**, but about **238,000,000** for **politics** and about **296,000,000** for **medicine**. The man-made things, however, beat them all: about **755,000,000** for **technology.** They have really grown up. **See Essay 53, A Supper with Birds and Planes.**



Economy is the main source of power and growth is an absolute obsession of global economy and everybody under its erratic skies. Greed is now called "individual maximization." Stock market is above all betting on growth (decline, too, as pre-growth). Academic productivity is a growing volume of grants and publications. Wealth is growth. Success is growth. Sex is growth. Collecting is growth. Sports is growth. Agriculture is growth. Tomatoes are growth. Career is growth. It is only in body weight and waistline that anti-growth begins to compete with growth, but the robust economy of weight loss is about growth, too.

In the eyes of physics the visible world is doomed to entropic decay, but life is about growing, blooming, and multiplying. Division is bitter, but multiplication is sweet.

In the last century, quite surreptitiously, economics had turned into the main interscience (but not yet science) of humanity, spanning from mathematics to biosciences and from thermodynamics to philosophy, with cognitive sciences in the folds. As physical sciences are united by the concept of energy, economics is united by the concept of money—same

money that divides the people who own it. For a compressed illustration of the ubiquity of economics, see **APPENDIX 1**. I confess, I was not prepared to find almost 1200 recognized subdivisions of economics (alas, no Buddhist economics there). In short, whatever you touch,

If you prick us, do we not bleed?

Yes, all 1168 listed topics of economics (in fact, there are more than that), big and small—even the poet, his winged Rocinante, and each published line—bleed with money, one way or the other.

> For example, *Northwest Florida Review* pays $5 per poem, while *Hayden's Ferry Review* pays up to $100, and *Boulevard* pays $250 or more. *The Meridian* pays $15 per page, and *The Georgia Review* pays $3 per line. *Northwoods Journal* charges a $1 reading fee for each poem. If they publish your work, they'll pay you $0.10 per line. (Source).

In my eyes nothing is as postmodern today as economics because it is about performance and performance is about growth. I begin to believe that the entire postmodernity in humanities and art, increasingly in sciences, and definitely in technology, is simply the complete absorption of human creativity of all kinds into the economy. I do not mean it to sound derogative. To scold evolution is to emulate King Xerxes who ordered to whip the sea for scattering his bridge made of boats.

Life is business. Business is the through-the-looking-glass wonderland, in which you have to run in order to stay in place and run twice as fast to get anywhere. The "heady current" rolls all things in its course. Postmodernity does not question ends: it watches the performance of means.

The Golden Standard of performance (source: Wikipedia):

> In 1998, Deepak Chopra was awarded the Ig Nobel Prize in physics for "his unique interpretation of quantum physics as it applies to life, liberty, and the pursuit of economic happiness."

The business of economics has its own economy. And, of course, here is economics of economics:

> July 23, 2007: **Google**: Results **1 - 10** of about **664** for **"economics of economics"** **[June 12, 2009:** about **907** for **"economics of economics"].**

Quoting the insightful Tom Coupe:

> "Economics of Economics is studying the behavior of economists and the characteristics of the economics profession. Maybe this is less wackonomics than the others as it's mainly of interest to economists. At the other side, some people clearly do not like it" (The Economics of Economics).

There are more "wackonomics" at Tom Coupe's site:

- The Economics of Football
- The Economics of Religion
- The Economics of Euthanasia
- The Economics of Crime

Meanwhile, the topic economics of terrorism is already a fully shaped domain:

> July 23, 2007: Results 1 - 10 of about 11,300 for "economics of terrorism." **[June 12, 2009:** about **43,800** for "**economics of terrorism**"**]**
> {April, 2016: about 151,000 results (0.34 seconds) }.

As an example of what can be found in the intellectual marketplace about growth, I would refer to the series of works by Oded Galor and co-workers (available online), bringing together biological and social evolutions in a non-trivial way.

> Unified evolutionary growth theory (the first one) that captures the co-evolution of:
> - Homo Sapience
> - Economies
> in the long transition from an epoch of Malthusian stagnation to sustained growth.
> The theory suggests that:
> - The epoch of stagnation that has characterized most of human history led to a process of natural selection that transformed the characteristics of the human population and made them more complementary to the growth process
>
> **Fundamental Premise** :
> During the Malthusian Epoch, the composition of characteristics of the human species that are highly relevant for the understanding of the origin of economic growth has not been stationary. Hereditary human traits, physical or mental, that raised earning capacity, generated an evolutionary advantage
> Source: Oded Galor and Omer Moav Natural Selection and The Origin of Economic Growth (2002)

Draw your conclusions, Piraha Indians of Amazon.

If everything is economics, then economics must be complexity in flesh. It is a stock of an incredible variety of publications, bold and bright, as well as dull and drab, see **Appendix 1**.

As I suspect, the postmodern market economy of intellectual production started with postmodern philosophy, of which David Lewis and his plurality of worlds is a relatively recent example.

The major drive came from the honest intent to understand complex systems. The work of Peter Turchin and his father Valentin Turchin, the founder of Principia Cybernetica Web , numerous incursions of theoretical physicists into the tides of market economy, artificial life, the Santa Fe Institute, the creepy promissory notes and the actual ruthless progress of cognitive sciences, and grand theories coming from everywhere are some of many indicators of the insatiable voracity for understanding complex systems in which human molecules display their chemistry. There must be some reason for that apart of the natural curiosity and quest for understanding. If kingdoms were never meant for sale, managerial skills are, and we can manage anything but complexity.

The religious faith in mathematical equations and the escape from the tyranny of facts are emblematic of postmodern industry of knowledge. There is, however, a definite center in the global subconsciousness, activated by the lessons of all the hot and cold wars of the last century, plus the new World War with the invisible phantoms of terror. We have conquered space and time. Future is the next frontier and growth is the only way to invade and conquer the future, to flood it with your presence and to build a castle on the top of a mountain. We do not want to build on sand. We need some certainty. We would like to slow down the future to be able to respond to it, as in times of good old European wars written into history by a quill.

My own view of the world, with hard graphic skeletons on the move instead of equations, comes from the same historical experience, in which I was late only for WWI.

The fate of North America and Europe has never been less certain for those who have long historical memory. The united states of United Europe are fragmented, and so are the united states of the United States. The not yet certified Science of Novelty (neology? the term is used in linguistic) which I am trying to peek into, is a paradoxical challenge to the classical science about the immutable laws of the world: I see it as a science about the shifting axiomatic grounds, about the rotating stage of the world theater, and about the limits of projections. As I tried to show in *The New and the Different*, the **new** is rare and it is dispersed in the overwhelming **different** , i.e., the recombinant variants of the old. The main problem of neology is not just to discern the new, which we can do well, but to estimate its kinetics: how fast it is running toward us before it freezes and petrifies into the old. Prediction without timing is fortune-telling.

> **NOTE**. I am greatly sympathetic of counterfactual thinking, which is now slowly burrowing its way through humanities. Chemical thinking is deeply counterfactual (*allofactual* is a better term) and requires a constant circumspection about what could possibly happen otherwise (look for transition state in complexity). The novelty of the physical universe crawls at a much slower pace than the novelty of human history or the history of our planet itself. Thus, life on the Earth is possible only because the Sun evolves incomparably slower than life. Who can seriously worry about the dimming Sun today? Probably, only the poets.

4. THE WORLD IS ON FIRE and Britain is to blame

As an example of the contribution of poetry to the chemist's vision of the world that I attempt to practice in my Essays, this is how I see the Industrial Revolution.



Let us look at the map of coal and iron ore resources of United Kingdom, **Figure 1**. They either overlap or are extremely close. As a chemist I see them mixed up in a crucible on a lab bench and expect iron ore, Fe_2O_3 , to react with carbon, C, resulting in iron, Fe, and carbon dioxide CO_2 , because it is thermodynamically possible. All we need to start the reaction is to heat the mixture up.

I see the early Industrial Revolution, therefore, as an ignition of the process of reduction of iron oxide into metal, made probable and sustainable by the proximity of both in England. The fire evolved into the streams of molten pig iron and steel that solidified in the form of bridges, railways, locomotives, and various steam engines. The streams of money from all new useful things also greatly elevated the status and fecundity of scientist and engineer, so that even more useful things could be produced. That was one of many derivative fires.

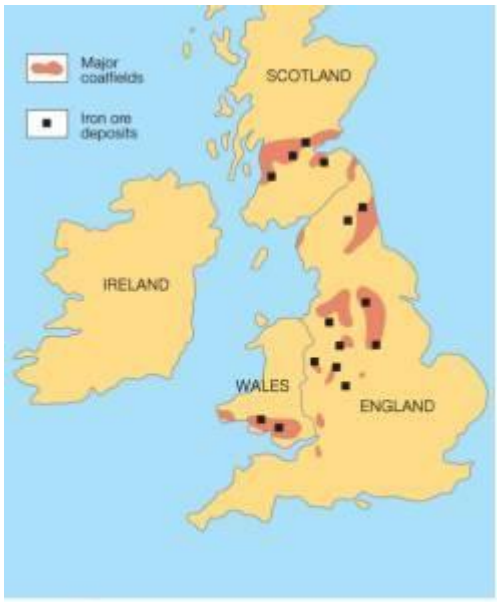


Figure 1. Coal and iron ore deposits of Great Britain

The steam engine evolved further through the internal combustion engine. It was a secondary fire, ignited from the first, in which mineral oil began to burn at ever increasing speed. The industrial use of electricity evolved into IT: information technology. The weak electromagnetic tremor in IT devices keeps tweaking the global nervous system with its creative and destructive impulses.

Fire in this picture is not just a metaphor but an **ideogram**: a template for a pattern of a process represented across many domains and levels of the world. Classical German philosophy, aloof about coal and iron, was also a fire, still preserved as embers. While the pattern is very general, the template is a configuration taken from just one domain, in this case, chemical one. The chemical process of self-sustaining and accelerating change goes until the fuel and the oxidant are

available and the temperature does not drop. Instead of fuel and oxygen, any two components can interact in a fire-like pattern.

The modern economic growth is a typical—and the brightest—example of fire that involves more and more mineral fuel. The natural limit on this process is one of very few indisputable but not yet unambiguously tested principles of economics. It has been examined, however, in physiology and medicine: breathing is a quiet and controlled chemical fire inside the organism. Without oxygen the human sooner or later dies, of which the torture by waterboarding takes notice. What leaves some hope to economics is that society always adapts, but at what price remains unclear even for economists.

Obviously, the fire has a chance to move into the stage of decline and collapse, which could still be kept at low metabolism for as long as its energy supply lasts. While energy is always partially dissipated, wasted, and irreversibly lost, matter is conservable and recyclable, for which, alas, energy is needed again. This simple comparison outlines the difference between Bios (life of organisms) and Technos (life of things): Technos can be recycled because its template —blueprints and files—are also species of conservable Technos. This difference today does not seem as sharp as fifty years ago: the templates of life can be digitized and stored as Technos, while the files of digitized Technos can be killed—erased without a trace—or mutilated, or, worse, stolen and turned into cash.

Fire is not evolution. It is a chemical reaction that runs irreversibly and ends. Fire always burns out. Same happens to wars, revolutions, classical German philosophy, and the upheavals like Communism and Islamism. Evolution grows forests of plants, animals, humans, and Things, and the lightning strikes of history start forest fires.

The global pattern of fire reflects in much smaller local outbursts. Here is another example from the insular Crucible of Industrial Revolution.

> J. K. Rowling writes her first *Harry Potter*, which spreads over the world like fire. In this pattern, the material object—book—that arose as a mutation in the mind of the author, probably, just from a cup of tea, interacts with the money of consumers. The global fire was started by a spark, probably, as accidental as the creative impulse, and further self-sustained by the high temperature known as hype.
>
> In the book business demand and supply are oxygen and fuel in the intake of the business machine. It is not important which is what: both are just two interacting components. We can imagine a planet with methane atmosphere and some limited source of oxygen coming from the ground. In this picture the **economic roles** of fuel and oxidizer are reversed.
>
> When the next volumes of paper fuel are thrown into the fire, the enterprise rises the next step up in the form of movies, trinkets, bookmarks, spoofs, and the rest of paraphernalia. Both supply and demand are limited, and so is the hype.

> Children have less choice than the readers of Nora Roberts because of the immense peer pressure. What happens as result is the loss of variety: the children read one huge volume after another on the same topic instead of absorbing twenty slimmer books which could open to them twenty new vistas.
>
> The business model took over Harry Potter after the writer had completed her first and most **creative** act, having established a template on which the process of growth progressed along a standard scenario, completely independent from the content and measurable as **performance**.

There are two kinds of growth. One is the relative and local growth that redistributes resources, reshuffles ideas, rearranges priorities, etc., within the available energy consumption until its source lasts. The other is the fire-like global growth, predatory, wasteful, frenzied, and dehumanizing. It consumes resources irreversibly, dissipates matter and energy, and expires at the end, leaving ashes and turning to new firewood.

I use the word "dehumanizing" without any scorn. It denotes the inclusion of humans into the modern economic metabolism which has brought a lot of stability, comfort, and "economic happiness," that most people in the West, including myself, enjoy and more have been embracing in the East. Still, anything ending with a question mark is legitimate within the framework of neology:

> Mankind unsparingly uses every individual as material to heat its great machines; but what good are the machines when all individuals (that is, mankind) serve only to keep them going? Machines that are their own end—is that the *umana commedia*? (Friedrich Nietzsche, *Human, all too Human*, "bad-tempered" thought No. 585, 1878)

With China and India burning in growth fever, with Russian czardom gloating over the kneeling for Russian gas Europe, I believe, we will know the answer sooner than we would like.

What is growth, then? What is its origin? What is that clockwork mechanism that spins the hands in one direction only? What is its blessing? What is its curse?

5. WHY EVERYTHING GROWS and cannot stop



What is the evolutionary necessity of growth in evolving complex systems, such as life or economy? I mean both the growth of an individual organism, for which there are obvious limits, and the property of organisms to multiply, i.e. population growth. The same question—why to grow—can be addressed to empire, social movement, religion, business enterprise, party, and knowledge factory.

Why does everybody and everything want to grow and what happens as result**?**

Physics is largely counterintuitive. We do not see gravitation and electromagnetic field, neither do we deal with atoms outside a lab. We do not measure physical properties without instruments. It takes a powerful mental effort to penetrate the surface of observable events. There are, however, areas of science that seem to come from common sense. Thus, probability theory, which can be as complicated as anything in mathematics, came from simple considerations based on everyday experience. Chemistry looks arcane, but the chemical concepts of random collision, favorable mutual orientation, bonding, transition state, and breakup have parallels in the peculiar human and animal behavior known as courtship and love. Chemistry is in on the tip of the tong in romance and politics driven by intuition.

From the chemical angle, i.e., from the atomistic perception of systems as stable units and bonds (or as configurations of Pattern Theory), there is at least one major obvious difference between big complex systems and small simple ones: size.

A small system can undergo a limited number of changes, many of them catastrophic. For example, the simplest system of two connected atomic units, **A—B**, can change in only one direction:

$$\mathbf{A—B} \rightarrow \mathbf{A + B}\ ,$$

which completely destroys its very identity. If the system is naturally in equilibrium between two parts,

$$\mathbf{A—B} \rightleftarrows \mathbf{A + B}\ ,$$

then an elimination or destruction of one part destroys the system. It took the early chemists an effort to understand that if salt disappears in water, not an atom is lost. It is certainly true in the world of atoms and molecules that if some molecule once arose from the environment than it can happen again. We are interested, however, in the emergence of Evolving **Complex** Systems (exystems). The spontaneous appearance of anything complex from something simple would require a rare coincidence of rare events. Similarly, regarding X-systems of cognitive, social, and political nature, the unique individuality of initiators, founders, and circumstances, once lost, cannot be replaced or recreated.

Complexity is improbable, unless we, complex creatures, create it ourselves, and yet X-systems can be stable (i.e., probable) only if they are sufficiently complex or at least large enough as populations. The solution of the paradox lies in the distinction between local and global.

In a system

A—B—A—B—A—B—A—B—A—B ,

a transformation

A—B—A—B—A—B—A—B—A—B —> A—B—A—B—A—B—A—B—A—B + A—B

or

A—B—A—B—A—B—A—B—A—B —> A—B—A—B—A—B—A—B—A—B + B

leaves **most** of the system unchanged. The same applies to an addition of an extra part by chance. If the major part is capable of restoring the damage, or if the damaged part is not essential, the dynamic non-equilibrium system, like trees and animal bodies, becomes exceptionally stable.

The big size, therefore, turns annihilation into damage. Growth is self-insurance against accidental loss. This sounds like economics (GEL classificator G22, Insurance; Insurance companies). In the origin and perpetuation of life, growth is life insurance.

Figures 2 and **3** illustrate growth as a major property of X-systems.

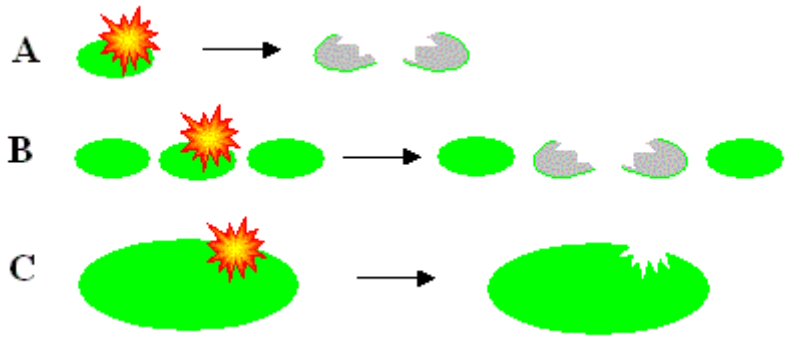


Figure 2. Size and damage
A. Lethality of damage to small size; **B**. Survival of population; **C**. Large size and damage repair.

A damage in a small system (**Figure 2A**) can destroy the system if the energy of the impact per unit of size is high enough. In a population (**2B**), a knocked out unit may not be fatal for the population. A large system (**2C**) can preserve viability because of the locality of the damage. The heavily wounded in Iraq soldiers illustrate human vitality, as well as the economics of presidency, in a macabre way.

In all X-systems, the **economic** function of growth, from the point of view of a **chemist**, is self-insurance against disaster.

A large complex system can be destroyed if it is crippled with several simultaneous hits. Coincidence of several rare events, however, is very low. The laws of probability—the simple property of our world, which is, probably, the best argument against deity—is what made life on earth possible.

Amazingly, physicists used the improbability of complex systems as an argument against spontaneous emergence of life. For a chemist, however, as for a builder, political leader, and scientist, the **gradual stepwise buildup of complexity** is their daily bread.

Figures 3A and **3B** show that if the **probability of the damaging factor**, i.e., **generalized temperature,** increases, a growth of the system is equivalent to an increase in temperature (intensity of chaos). A combined multiple damage, however, can be beyond repair. Again, look at the Republican Party and the President's crumbling internal circle. Under right circumstances the same could apply to the Democrats, who should not be too gleeful.

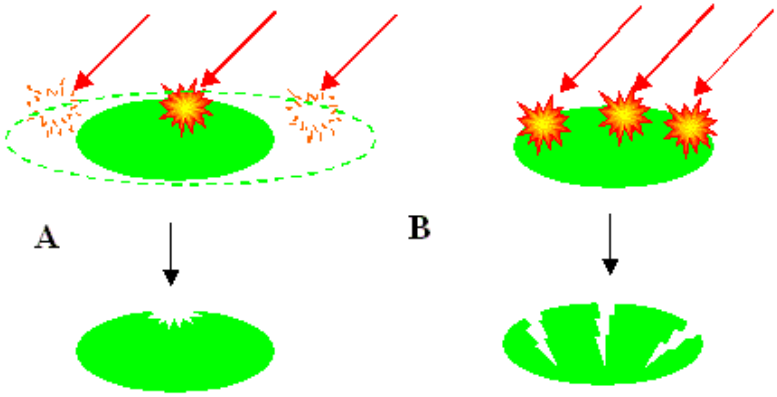


Figure 3. Size, temperature, and vulnerability
A. Growth (broken line) increases the vulnerability to multiple defects at the same probability of damage;
B. Increased probability of damage (i.e., high temperature) creates multiple damage beyond repair.

The size of the individual system and the size of population seems unconditionally beneficial only at the very state of emergence when the medium from which life emerges

works as an inexhaustible resource. When the resource becomes limited, anti-growth plays tug of war with growth.

Growth has some unintended by Creator consequences for the evolution of exystems, but that should be a separate subject. In short, the excess of energy and matter over the minimum necessary for subsistence, vaguely similar to the famous *Mehrwert* , surplus value of Karl Marx, creates a step—a green pasture—toward the next level in a food chain. The simple reason is that biochemical mechanisms of life are universal. The variety emerges and evolution takes off full throttle: the lion hunts antelopes, the government collects taxes, the professor steers the postgraduates in the direction of his career, the bookstore peddles Harry Potter trinkets, and wealth creates super-wealth.

In human matters, as in biochemical matters, the mechanisms of evolution are universal because humans are universal enzymes capable of assembling and taking apart anything, from political system to article on economics, and from nuclear weapons to reputation. The moment comes when humans start manipulating living organisms, and, finally, their own bodies and somebody else's minds.

The next natural question is how a non-equilibrium system can be stable, if only temporarily, since any deviation from equilibrium decreases stability. The answer is that equilibrium is the most stable state only of a closed system. The surface of planet Earth is an open system: open to solar energy, energy of the planet's core, and the cold of the space.

Why do we need instability to ensure stability? Why do exystems need to be far from equilibrium , i.e. to continuously consume energy and disperse heat? The answer was given by Erwin Schrodinger in 1944 in an incomparably lucent form. The text of his groundbreaking book *What is Life* is available on the Web. It was the very beginning of the revolution in biology. I see it as the firm and lasting foundation for the science of exystems.

Schrodinger warned his audience that the subject matter of his public lectures, which preceded the book, was difficult. It still remains difficult and incessantly stimulating. I do not need to repeat here the discussion of the thermodynamic aspects of life in a large popular literature, as well as in complexity. I am more interested in non-biological exystems, among which the ailing American Democracy is the closest to my heart (are many readers today as excited by Alex de Tocqueville as I was?).

Time to move from the sunshine exuberance of growth to the rainy days of decline.

6. DIVISION AGAINST MULTIPLICATION: federalism? feudalism?

Next, what is the consequence of growth?

Growth is suicidal. But take it easy, so is life. As Anton Chekhov said, life is a deadly disease: the one who lives inadvertently dies.

As an economic and political phenomenon, growth carries a kind of autoimmune disease that kills it long before the total global triumph.

The same objection of improbability that physicists have been setting against the spontaneous origin of life applies to the origin of species. If genome is very long, as it is in most species, then Darwinian evolution may look problematic. The probability of a significant viable mutation, like the elephant's trunk, is very low (do we, really? it is just a multiplication of a nose unit). To continue generalization, radically new developments in history (WWI, 9-11, military challenge to US, catastrophic presidency) are highly improbable a priori because our imagination is not only boundless but also tuned up to optimism.

It seems to me that it is exactly the large size of genome, which makes most local changes in it realistic, ensures evolution, so that other subsystems of the organism stay untouched and ready to accommodate the new change. For example, the elephant's trunk may be a result of a mutation at a very early stage, so that muscles, nerves, and vessels automatically follow the new shape of the nose. By the same logic, only in reverse, if the genome evolves as a set of nested compartments organized like a tree of systematics, a viable mutation should be close to previous mutations in the same subsystem of the organism and have non-disruptive character.



The role of size and number in evolution has been discussed, but I am scarcely familiar with literature on the subject, so that the above and the following is nothing but my uneducated guess. My purpose is to illustrate the generality and the commonsensical nature of chemical view of the world. I can do it only by observing the world from sufficient distance.

Biological life, paradoxically, is much less mysterious than biological death. It is hardly a surprise that history has the same asymmetry. Any empire is inherently unstable and is either in deep slumber or in turmoil. But why is its growth lethal?

In the same way that growth makes any change more and more local, it makes any authority less and less potent. When empire—company, office, clan—grows, the leader faces more and more unpredictable events and contradicting choices. The leader loses efficiency and delegates increasing part of his duties.

It does not look like anything having to do with chemistry. But, as I noted in **Essay 53, Power: Hidden Stick, Shared Carrot**, there is an analogy between concentration of

social and financial power and localization of energy in quantum physics, which plays profound role in chemistry. See also **Essay 37, On the Soul**.

Social structures need leaders, but why? What is so different about social chemistry, as compared with molecular chemistry?

While positive chemical bonds are more stable than disconnected atoms, social bonds can be either way: positive as well as negative. Some, like the mother-child bond, are very much like chemical bond, but some family and work ties are negative in the sense that they need a constant effort (supply of energy) to maintain, like to keep the ball in the air. In politics, mutual sympathies between nations are exception rather than rule. The most notable example was the forceful unifying of disparate nations and sects by Saddam Hussein in Iraq. The mutual distrust and hate exploded after the liberation. Rivalry is just another word for competition not only in democracies, but also inside all units of any society: family, institution, school, armed forces, science, arts, and government.

There is an important difference between negative and neutral bonds. The latter require approximately equal energy to lock or to break. For example, to close or open a door requires about the same energy in the absence of any other external influences. To keep the metaphoric gates of secrecy, more material gates of illegal immigration, or quite nightmarish gates of terrorism closed requires a constant work. To keep the society open requires a lot of work, too. For that purpose the entire design of the social and political machine was put on a blueprint in the US Constitution. Freedom can be exhausting.

In short, the force of authority is needed to keep a social structure in shape. The problem with the growth of a social structure is that the sovereign power of the leader per unit of size decreases with the size. Any added deputy has a more concentrated power over a smaller unit, but at a price: his or her own power and freedom of choice is limited by the immediate superior. **Figure 3** illustrates the expansion of an abstract "kingdom," the appearance of an intermediate executive body, a mesoderm (see also **Essay 43** on mesoderm), and the transition to "federalism."

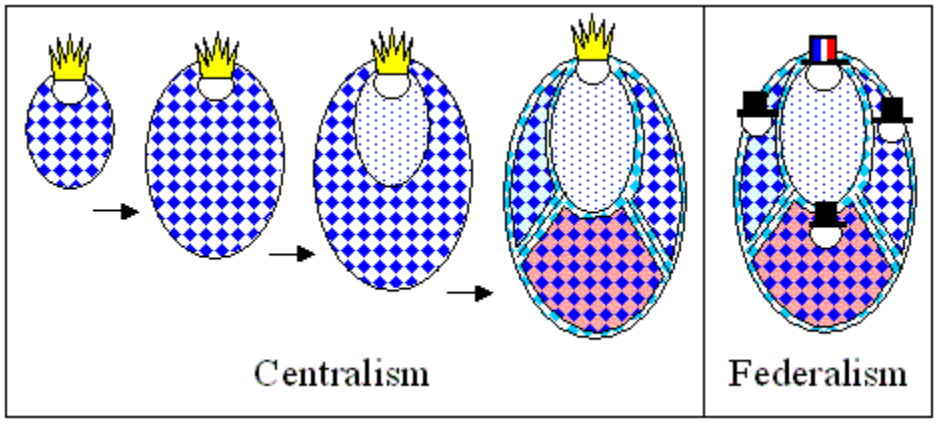


Figure 4. Growth and differentiation of management and function

I find **federalism** a convenient shortcut for a class of complex systems that are absent, as far as I know, in animal populations. It is new and rare in history, and can, probably, exist only at certain conditions. Still, it is well worth generalization because "democracy" is too political and multiform.

Federalism, the division of the system into semi-independent units, the abolition of the czar, and the limits on personal power of local leaders have been, probably (who can know for sure?) the main reason for the long, rarely fractured record of success of American society, the success being measured by the general stability.

Social stability is a curious phenomenon. My naive impression is that the American stability is based on the overall acceptance of the margin of instability in the form of poverty, crime, fraud, deviance, and just simple stupidity. The optimistic America, unlike the stern and pessimistic authoritarian and idealistic societies, accepts the imperfections and risks associated with life on the move. It has the courage to face life. The totalitarian society, in which I lived in Russia, was based on expecting the worst from people and was struggling in vain for perfection. Hypocrisy is the natural outcome of the struggle in secular and religious orthodoxies.



Figure 5. Vulnerability of the centralized system

Figure 5 symbolically portrays the consequences of centralization of management: the damaged core can be sensitive to small damage with fatal consequences to the entire system.

NOTE (2016). Russia was in shambles after its revolutions of 1917 and 1989. This is why

Intuitively, **federalism** and **feudalism** somehow fit the same very abstract **contractual** pattern. This is a haunting question, cautiously but persistently brought up in literature (**Google**: Results **1 - 10** of about **74,700** for **feudalism federalism August 11,2007)**

Both **federalism** and **feudalism** are etymologically related to trust (fealty, fidelity, and federal come from *fidere*, to trust). The lord trusts the vassal, the sub-units trust the federal representative. The states get pork, the vassals get fiefdoms. The lord has no separate army to have a hold over the vassals. The transition from feudalism to capitalist democracy, therefore, looks like evolution of the energy resource from renewable (land) to exhaustible (mineral fuel): from a society of humans to a society of machine parts. Otherwise, the structure of relations is similar.

The power of a feudal lord was measured in the currency of land. The modern currency of power is money. I hope that I am still within my limits of foolishness by saying that the immense concentration of private wealth in modern times, especially in conjunction with limited energy resources, revives some patterns of feudalism. Whether federalism, or feudalism, or another term from history books, patterns are not anchored: they float through time, place, and across interdisciplinary borders.

> **NOTE** (2016). I am now in the world flooded with oil and gas. The stock market is neurotic because it takes it for the end of growth. Yet mineral fuel remains limited for more reasons than ever. Even the sunlight harvest is limited, but the non-mineral energy—that of the sun, tides, and winds—is still enormous. The consequences of changes in sources of energy, including human labor, are still unexplored, however. We are busy with traveling to Mars.

If all that looks outrageously simplistic, it should: the chemical view of extra-molecular world does not solve any problems. It only helps to see the bones through the fat flesh of complexity.

As far as growth of complexity is concerned, it evolves in at least three forms:

Type of growth	**Stages of growth** →					
Size	a	a	**a**	A	A	…
Multiplication (mutation)	a	a, a	a, a, a, a (a, a, b, a)	…	…	…
Structure	**A**	**A-b**	**c-A-b**	**c-A-f-b**	**c − A** **/ ** **f b** **/ \ \|** **k l m**	…

Growth is trivial. What is anti-growth, then? The trivial part of it is known as decline. Is there anything less trivial? I believe it is the **will not to grow**, moreover, the will to have **less.**

> **NOTE**: Growth of temperature, chaos, and uncertainty may not be consciously pursued in business, but it is still growth, set as a goal in insurrections and revolutions.

PART 3 LESS is the only solution, but what is the problem?

7. INTRODUCTION TO ANTI-GROWTH : Dhammapada, Verse 167



In an oblique way, this Essay is a repercussion of the impact of Dhammapada on my youth.

I now identify the short ancient book's invective against multiplication with the call to limit growth. What can be a less popular idea in America? This is why I keep it in the folder of **blind moral principles**. All religions are irrational and all ideologies are beyond proof. All prophesies require long waiting until they are useless, true or not. Reason and belief do not mix, except in the belief in reason.

My own copy of Dhammapada was the highly professional Russian translation directly from the language of Pali, elegantly published in 1960. What impressed me so much in my youth was the commandment rendered as "**do not increase existence**." [не увеличивай существования]. I had left the book in Russia, but when I returned to it in English translations, I ran into a mystery.

Chapter 13 of Dhammapada starts with Verse 167:

hinaj dhammaj na seveyya pamadena na sajvase
micchaditthij na seveyya na siya lokavaddhano

In various English translations the fourth part of Verse 167 , **na siya lokavaddhano,** has been translated differently, but mostly converging on a single meaning:

(1) be not a friend of the world,
(2) do not be a world-upholder,
(3) linger not long in worldly existence,
(4) don't busy yourself with the world.

There were interpretations more in line with my personal perception:

(5) do not cultivate the world,
(6) do not augment the world.

The discrepancies had been troubling me until I found a detailed interpretation at the Digital Library & Museum of Buddhist Studies of National Taiwan University Library, where the verse was translated as:

> Don't practice inferior teachings; don't connect with negligence.
> Don't embrace wrong beliefs; don't be attached to the world.

But the linguistic commentaries in the same source seemed to suggest another interpretation.

The key last word *lokavaddhano* is a composite of *loka*, world, and *vaddhano* , derived from *vaddhana* translated as indulgence, attachment. The commentary, however, mentioned that its root was *vaddh-* , growth. The word *vaddhano* was Nominative of singular, masculine noun. Literally, as I see it, the grower of the world.

I found also a more direct translation at *Concise Pali-English Dictionary*:

> **vaddhana** : *[nt.]* growth; increase; enlargement. *nt.* : neuter gender.

My initial understanding since the age of 25 was **do not multiply existence,** i.e., with hindsight, do not grow complexity, do not grow attachments, do not surround yourself with numerous objects of desire and care, do not multiply material things. In short, **minimize**. In modern lingo, it, probably, sounds like **focus** and **prioritize**. When, at about that age, I had read about Albert Einstein not wearing socks and using the same soap for washing and shaving, I saw him as a Buddhist simplifier.

By no means I consider myself a true Buddhist. Besides, "true" is the most divisive word if applied to religion or ideology.

I am not attracted to either mysticism or asceticism. I have a few superstitions (the spiders bring good news and I never kill them; one should never mix fresh milk and cucumbers; do not gossip), but I do not believe in any world but the one around me. And yet Buddhism has the same spell on me as on many Western people. One of its charms is some separation between the final goal and the ways of achieving it. The rich assortment of ways and means in Buddhism allows for unwrapping one item without opening another. One can be happy just by walking the pathways and coming home. The dogmatic symmetry of the Buddhist teaching and the tight straps of control over young prankish chaos never attracted me, but they were a good preparation for mature age.

To summarize, Dhammapada imprinted me with a clear **distinction between necessity and excess** in material world. We are individual in our needs but faceless in our temptations. The luxury and wealth of ideas is a quite different matter.

A very selectively read Dhammapada is one of my sources of **blind moral principles** (BMP) which have nothing to do with reason and logic. They complement for me the more pragmatic, explicit, and commanding Judeo-Christian principles. The BMPs are axioms of human existence and by choosing, inventing, or inheriting different sets of axioms we sign up to a life of not always realistic ideals.

> **NOTE** (2016). To summarize my material life, I followed Dhammapada—partly, by circumstances, partly by choice.

To endure order and to wreak havoc are two ends of the scale of human behavior. What makes life worth living is that we constantly bend and violate our principles. No religion shuns this game, not even fundamentalism, but the Evangelical Christians in America seem to beat anybody else in lavishly dispensing forgiveness to each other at the expense of tolerance.

My meditation on Verse 167 of Dhammapada should not be taken too seriously. I am not an expert. Besides, following blind moral principles, I do not need to care about facts and truth. This is convenient but certainly incompatible with science. There is, however, a small (Google: about **25,200** for **"buddhist economics", August 7, 2007;** 42,100 in 2016) but well-tended plot of Buddhist economics, which I am not to visit here. The vast Economics, however, cannot be neglected in any way because it is has already fused not only with the biology of the global population of Homo sapiens, but also with its blind moral principles. What Michel Foucault called bio-politics is nothing but economics.

> **NOTE**: Taoism (Lao Tzu) is another source of anti-growth ideas. There must be some reason for the emergence of the detachment idea in Eastern philosophy.

8. IDEOLOGY AND ENERGY : the sleepy hollows of life



The anti-growth spirit of Buddhism has not yet presented any real competition to the ideology of growth. Nevertheless, anti-growth happens all the time, coming, of course, as growth.

I believe there are at least three ways of anti-growth caused by growth.

1. Consequence of growth of one or more among competitors for a limited resource. This is the most trivial phenomenon of biological and social evolution. It is often overlooked, however, that land is the most ancient limited resource. Land is a natural, powered by sunlight machine for growing food, building materials, and animal power. There is the trivial zero-sum growth, in which competitors push each other away over a nearly constant resource, as the history of European empires and real estate in Manhattan exemplify. If history did not end long ago, it is because the efficiency of the land use has been growing (growth, again). I am interested, however, in the Manhattan of the size of the Earth, flooded not with dollars, but photons of the sunlight. The little Manhattan can be built upwards and downwards, but its supply of sunlight does not change, while demand for energy increases. The Earth is no different, but has neither bridges nor tunnels to the rest of the universe, except the one-way bridge from the Sun.

2. Consequence of errors and chaos in the systems of control and management. The particular talent, mental decline, or death of an authoritarian leader often changes the fate of the entire system. So does the elected leadership, for better or worse. In business and government, the threat of collapse is countered with more: more time, more money, more troops, more information technology, more subcontractors, etc., until the downturn comes.

3. Anti-growth as an idea.

I am morbidly fascinated by ideas, the invisible and intangible ghosts that rule our human world. The first two kinds of anti-growth are known as the trivial decline, but the world of ideas is so evolutionary new that we, humans, have not yet quite adjusted to their immaterial power. Take philosophy: after Aristotle it is never about the world but about our ideas of it. We know what to do with a dollar bill and a donut, but what to do with ideas, except trying to sell them as fast as possible?

That growth of economy means borrowing against the future has been suspected or well understood for quite a time. There is a significant volume of literature related to what I would call economic anti-growth, more accurately, the ideology advocating limits to growth . It all started in 1972 with *Limits to Growth* (abstract) published by **The Club of Rome** and updated after 30 years. The idea itself goes back to Robert Thomas Malthus, who did not anticipate, however, any economic competition between babies and their toys.

The anti-growth ideas find their way up from the social subconsciousness in various forms: from protection and preservation of environment (also in the form of growth of nature preserves) to discrediting the growth of bottled water industry, which will certainly mean a growth of some grotesque alternative. Here is something about beer:

> While many deplore the drunken Brits wandering Prague, criticism has begun to come from a new source: environmental groups who are not amused by the carbon emissions their short- and midrange flights leave in the atmosphere. Last week some 2,000 anti-climate-change activists set up camp at London's Heathrow Airport, one of the world's busiest hubs, to protest the emissions spewed by such flights. Environmentalists also protested the airport's plan to add a new runway. (Source: The Prague Post , August 22, 2007)

There is, however, a categorical NO to MORE and an equally categorical WELCOME to LESS.

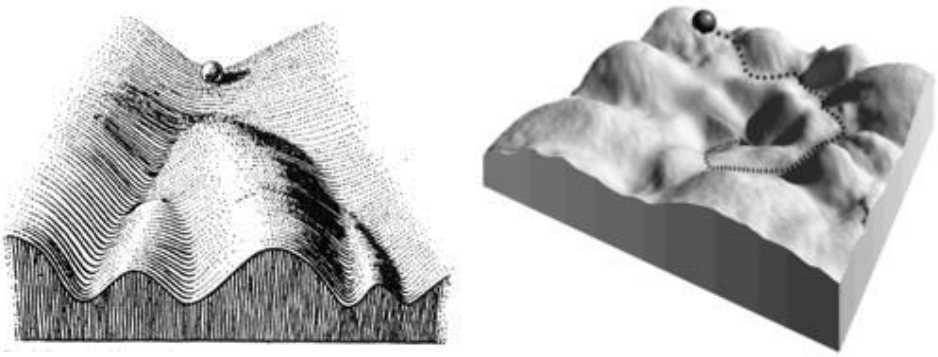
As an example of the modern form of the categorical anti-growth, I would quote a publication of The Free Range **Energy Beyond Oil** Project :

> **Why the Only Solution is "Less"** The Laws of Thermodynamics cannot be changed – if we don't have the energy we need we are unable to carry out the work we want to. Consequently, as we face a peak in global energy supply, there is only one realistic option: We have to use "less" energy, and consume "less" resources.

By growth and anti-growth I mean not just ideas, but **ideologies**, the programs for action, competing for a nest in a **growing** number of minds. The ideologies set the direction of social change in the same way as energy landscape sets the direction of change in physical and chemical processes.

The role of ideology can be compared with the tilt of a tray with a ball on it. By changing the tilt we make the ball roll in certain direction. The tray of evolution, however, is not flat. There are valleys and hollows in it where the ball can come to a relative rest, provided we do not shake it too much. The tray of life is coming toward us like a long treadmill and we cannot see what is there behind its point of return. Neither can we stay in cozy hollows: we have to run from the point of entry behind or we would fall off. Did Lewis Carroll anticipate a conveyor belt in 1865?

The visual metaphor of landscape in evolution was suggested by Conrad Waddington (1905-1975), **Figure 6A.**



A **B**

Figure 6. **Stability landscapes**

A. Epigenetic landscape along C. H. Waddington. **B**. Energy landscape

The illustration (6A) from his book *Organisers & Genes* (1940) is explained as follows:

> Waddington's epigenetic landscape is a metaphor for how gene regulation determines development. One is asked to imagine a number of marbles rolling down a hill towards a wall. The marbles will compete for the grooves on the slope, and come to rest at the lowest points. These points represent the eventual cell fates, that is, tissue types.

Obviously, the same can be said about memes of different ideologies. The ideology landscape generates certain types of behavior, which are stable in the corresponding ideological environment. They could clash with a different environment, as sometimes happens with immigrants. I use this digression to emphasize the universality of stability as the abstract counterpart of energy in physics (**Figure 6B**).

It is time to reveal my personal tilt.

I am whole-heartedly, although only instinctively, for limited growth, preservation of nature, and minimizing waste. What thermodynamics tells me, however, is that to counter the powerful natural will to grow, we need to use more energy, consume more resources, and to write more checks. The prospect of a war against growth is ghastly because it is a war against our own human nature. I also realize that the occasional excess is the spice of life, while the regular excess is just routine and needs more and more excess.

If so, any proponent of anti-growth cannot rely on rational arguments. We simply do not know what is going to happen if we rein in our inborn will to grow. Anti-growth can be just another suicide cult or a pretext for violence. If we cannot indefinitely grow energy production, then let **evolution** (economics calls it **market**) take its course and just hope that adaptation will prevail. Anyway, dinosaurs had adapted as lizards). All the more, it is absolutely hopeless to fight evolution. By definition, evolution is what happens in the end. I suspect, however, that the role of ideas in human evolution is largely unclear. We can evaluate it *post factum*, but not *in situ nascendi* , when we need it most.

I am for conservation, prudence, frugality, against waste, against aggressive litter of disposable gadgets and toys, theft of time, dumbing down, and voluntary slavery of being wired and always on call. Am I a retrograde grouch? Quite possibly. Another possibility is that I have a hypertrophied instinct of freedom and feel aversion to the prospect of becoming a part of a machine or a herd. But whatever anybody is for, there is someone who is against it or there is the only someone whose opinion matters.

Growth is what most people want, do, and celebrate. It is here. Anti-growth is what some dissidents and apostates want, do, and celebrate, probably, only because it is not there. Anti-growth means to keep growth in check, which may require as much energy as growth.

A pure idea itself is beyond quantification. On the contrary, the meme of the idea is as much prone to growth in a population of minds as crabgrass among lawn grass.

If not rational, than what kind of argument can I present for anti-growth?

9. WHY NOT TO GROW



I feel uncomfortable in the world of ideologies. Ideology is anti-freedom of thought more than anti-anything-else. While I cannot act by non-thinking, I can act by feeling, doubting, and, probably, by non-acting (*wu wei* in Taoism).

How can we justify anti-growth if, indeed, thermodynamics does not say anything nice about **the future of us, humans?** I do not have rational arguments for anti-growth. I do not have even any personal interest in it. I confess of having some strong atavistic instincts of growth.

My own argument against growth is artistic, i.e., essentially, poetic. It is also pictorial, see **Figure 7**. In my youth I saw the world as a borderless globe on which humans could move in any direction, build any life they wanted, and grow toward the stars. With time, after the influence of thermodynamics, personal experience, observation of the changing world, and especially after moving to America, I began to see the human position in the world differently: as the place inside a sphere, not on it. It was not because the exhaustion of resources had come earlier than expected, but because I saw the incredible extent of waste in the disposable civilization in my new life against the incredibly low level of consumption in my previous life. I have no expertise in the problem except the emotional one.

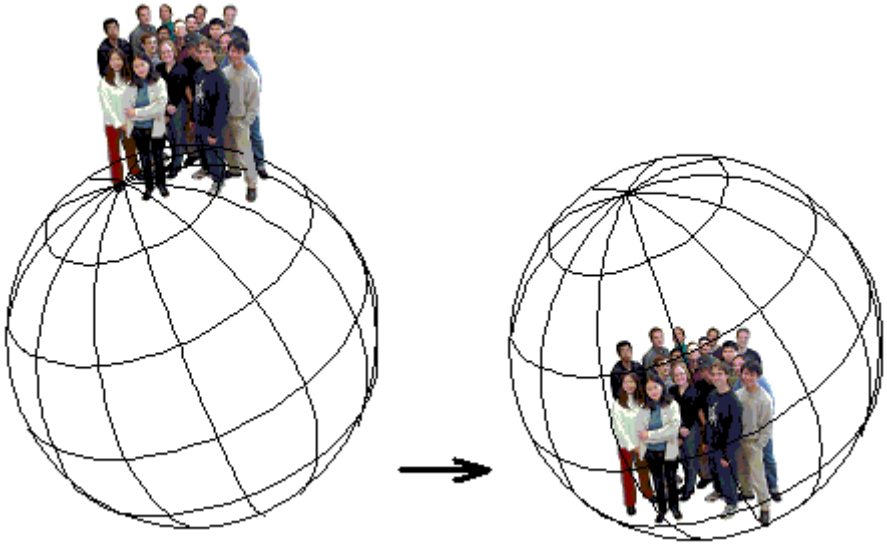


Figure 7. The open (A) and closed (B) worlds.

We live in a world closed in space. Thermodynamically, it is a system open only to energy. It could be compared with a hot air balloon in the air, **Figure 8**, flying to an unknown destination. We all are in a closed cabin. We burn our fuel or use the sunlight. I have to share space and breathe the same air with mostly indifferent, occasionally friendly, and also sometimes highly unsympathetic and hostile people. Moreover, most of my companions are not even people. Some are animals and plants, others just man-made or self-made Things that need energy, others are parts of human bodies, like heart pacer, stent, and electronic prosthesis.



Figure 8. Untitled

I want to stretch my legs. I want privacy. The food and water are limited. The fuel in the tanks is limited. What should I do? I do not ask "What we should do?" because there is no "we." When the fuel nears the end, who is going to be jettisoned to keep the balloon in the air? The scientist, who can divert energy from the sunlight? The dictator, who could maintain order? The free thinker? The unbeliever? The Hummer monster? The computer, which does not take too much energy and does not whine for water? Me, who keeps to himself?

I have to grow myself into "we," grow that "we," and make sure **we** do not believe anymore in growth. We have to land, to find a place under the sun, and to think what to do next, and, probably, how to escape the Inquisition of Holy Growth, with the blueprints of our minds stored in Google's web search records.

It is remarkable that not only the arthritic Microsoft but also the young Google, whom I noticed and embraced right after his birth, are being discussed today in connection with evil.

I realize that my antipathy to growth does not make any logical, scientific, economic, or any other sense. Anti-growth, or Tao—it is just a blind moral principle, double-edged, like any blind moral principle, even "**do not kill"** that can turn suicidal. Waste of energy and matter, disposal of able man-made things, waste of human time and attention are in my overheated imagination the next level below murder.

Economics captivates and unnerves me. Is it just a modern religion with the only commandment: grow and multiply? Is it an ideology of extremes, polarities, and contrasts, the wind that fans up the new world fire in which oil, nature, vehicles, and lives are burning? Is Confucianism, with its commandment of the Middle Road, a kind of anti-economics? Didn't it bring to power Mao and his frenzy of destruction, as well as the post-Mao frenzy of construction? Economic growth was as much an obsession of Soviet Communism as it has been of capitalism. Disruption, the new buzzword of business, associates in my mind with the Soviet slogan of destruction of the old world.

Economics is a religious sanctification of growth. As any religion, it cannot be fought with arguments, but only with another religion. It is useless to fight for alternative sources of energy because with the ideology of growth they will be very soon exhausted by growing consumption and waste. We have perfect photo cameras and generate billions of photos that nobody will ever have time or curiosity to see. We have powerful fast computers and devour a mass of visual information that will leave no trace in our minds. We have high speed internet filled up with junk mail and ephemeral graphics. Whatever we grow will be consumed or wasted, enjoyed for a second, at best, and discarded.

We, humans, are still unique: we have ideas, some of them suicidal. All I can do is to provide another temporary storage for the meme of anti-growth. I hope, Tom Coupe will refer us someday to his wackonomics page The Economics of Anti-economics. The rest will be decided by evolution. Probably, anti-growth is just a recessive meme waiting for its time to become a next disruption. Let us keep the idea in mind—the pool of genes for evolution to tinker with.

Growing my own website, I see the clear effects of excessive growth: repetitions, loss of focus, loss of connection between segments, rambling, superficiality, loose ends, too much involvement into form at the expense of substance, probably, awful English, and worst of all, the intimidating, self-defeating **size** that makes it inaccessible and boring. If this website were an economic enterprise, it would be already doomed, unless I could clone several people out of myself. **But it is not**. Still, maybe it is time to wind up. **But this is the same as to die**. Life is growth.

Sorry, no space here for anti-life.

> **NOTE** (February 18, 2008): I must not be ambiguous about the major fact of life: it ends with death, for which the "anti-life" euphemism is silly.

APPENDIX 1

Social Science Research Network

SSRN Abstract Database by JEL Classification

The database consists of **1168 lines**, of which I list only **130**, some human issues in red, to illustrate the variety of topics:

A: General Economics and Teaching
A11 - Role of Economics; Role of Economists
A13 - Relation of Economics to Social Values
A2 - Teaching of Economics
A21 - Precollege
B: Methodology and History of Economic Thought
B1 - History of Economic Thought through 1925
B2 - History of Economic Thought since 1925
B23 - Econometrics; Quantitative Studies
B3 - History of Thought: Individuals
B4 - Economic Methodology
C: Mathematical and Quantitative Methods
C12 - Hypothesis Testing
C13 - Estimation
C14 - Semiparametric and Nonparametric Methods
C3 - Econometric Methods: Multiple/Simultaneous Equation Models
C34 - Truncated and Censored Models
C53 - Forecasting and Other Model Applications
C6 - Mathematical Methods and Programming
C62 - Existence and Stability Conditions of Equilibrium
C63 - Computational Techniques
C7 - Game Theory and Bargaining Theory
C8 - Data Collection and Data Estimation Methodology; Computer Programs
D: Microeconomics
D00 - General
D1 - Household Behavior
D12 - Consumer Economics: Empirical Analysis
D18 - Consumer Protection
D2 - Production and Organizations
D21 - Firm Behavior
D3 - Distribution
D31 - Personal Income and Wealth Distribution
D4 - Market Structure and Pricing
D46 - Value Theory
D5 - General Equilibrium and Disequilibrium
D6 - Economic Welfare
D61 - Allocative Efficiency; Cost-Benefit Analysis
D63 - Equity, Justice, Inequality, and Other Normative Criteria and Measurement
D64 - Altruism
D7 - Analysis of Collective Decision-Making
D71 - Social Choice; Clubs; Committees
D72 - Economic Models of Political Processes: Rent-Seeking,
Elections, Legislatures, and Voting Behavior
D73 - Bureaucracy; Administrative Processes in Public Organizations
D8 - Information and Uncertainty
D84 - Expectations; Speculations
D9 - Intertemporal Choice and Growth
D91 - Intertemporal Consumer Choice; Life Cycle Models and Saving
E: Macroeconomics and Monetary Economics
E21 - Consumption; Saving
E3 - Prices, Business Fluctuations, and Cycles
E4 - Money and Interest Rates
F: International Economics
F1 - Trade
F17 - Trade Forecasting and Simulation
F2 - International Factor Movements and International Business
F3 - International Finance
F4 - Macroeconomic Aspects of International Trade and Finance
G: Financial Economics
G1 - General Financial Markets
G11 - Portfolio Choice

G33 - Bankruptcy; Liquidation
H: Public Economics
H1 - Structure and Scope of Government
H6 - National Budget, Deficit, and Debt
I: Health, Education, and Welfare
I3 - Welfare and Poverty
I31 - General Welfare; Basic Needs; Quality of Life
I32 - Measurement and Analysis of Poverty
J: Labor and Demographic Economics
J1 - Demographic Economics
J12 - Marriage; Marital Dissolution; Family Structure
J13 - Fertility; Child Care; Children; Youth
J17 - Value of Life; Foregone
J2 - Time Allocation, Work Behavior, and Employment Determination
J28 - Safety; Accidents; Industrial Health; Job Satisfaction; Related Public Policy
J5 - Labor-Management Relations, Trade Unions, and Collective Bargaining
J6 - Mobility, Unemployment, and Vacancies
J7 - Discrimination
K: Law and Economics
L: Industrial Organization
L1 - Market Structure, Firm Strategy, and Market Performance
L2 - Firm Objectives, Organization, and Behavior
L3 - Nonprofit Organizations and Public Enterprise
L82 - Entertainment; Media (Performing Arts, Visual Arts, Broadcasting, Publishing, etc.)
L83 - Sports; Gambling; Recreation; Tourism
M: Business Administration and Business Economics; Marketing; Accounting
M1 - Business Administration
M14 - Corporate Culture; Social Responsibility
M5 - Personnel Economics
N: Economic History
N1 - Macroeconomics and Monetary Economics; Growth and Fluctuations
N4 - Government, War, Law, and Regulation
N5 - Agriculture, Natural Resources,
O: Economic Development, Technological Change, and Growth
O1 - Economic Development
O40 - General
O41 - One, Two, and Multisector Growth Models
O42 - Monetary Growth Models
O47 - Measurement of Economic Growth; Aggregate Productivity
O49 - Other
O5 - Economywide Country Studies
P: Economic Systems
Q: Agricultural and Natural Resource Economics
Q2 - Renewable Resources and Conservation; Environmental Management
R: Urban, Rural, and Regional Economics
R21 - Housing Demand
R3 - Production Analysis and Firm Location
R53 - Public Facility Location Analysis; Public Investment and Capital Stock
Z: Other Special Topics
Z1 - Cultural Economics

Examples of entries:

Why Kill Politicians? A Rational Choice Analysis of Political Assassinations

Bruno S. Frey

Why Kill Politicians? A Rational Choice Analysis of Political Assassinations

BRUNO S. FREY
University of Zurich - Institute for Empirical Research in Economics (IEW); CESifo (Center for Economic Studies and Ifo Institute for Economic Research); Swiss Federal Institute of Technology Zurich . May 2007.

Abstract:

In the course of history a large number of politicians has been assassinated. A rational choice analysis is used to distinguish the expected marginal benefits of killing, and the marginal cost of attacking a politician. The comparative analysis of various equilibria helps us to gain insights into specific historical events.

The analysis suggests that - in addition to well-known security measures - an extension of democracy, a rule by a committee of several politicians, more decentralization via the division of power and federalism, and a strengthening of civil society significantly reduce politicians' probability of being attacked and killed.

Keywords: Rational choice, democracy, dictatorship, assassination, deterrence

JEL Classifications: D01, D70, K14, K42, Z10

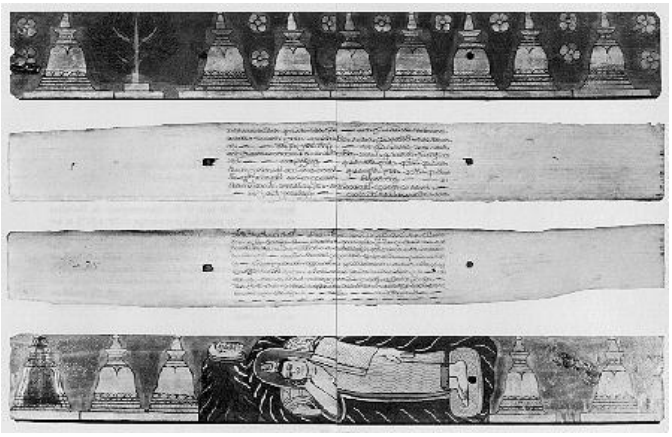
I29 - Other

Mental Health and Higher Education: Mapping Field, Consciousness and Legitimation
Critical Social Policy, Vol. 16, No. 2, pp. 31-56, 2006
Sally Baker , Brian Brown and John Fazey , Bangor University , De Montfort University and Oxford Learning Institute, *Date Posted:* May 17, 2007, *Last Revised:* May 17, 2007 Accepted Paper Series **5** downloads

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IZA Discussion Paper No. 2231
Arnaud Chevalier and Leon Feinstein University College Dublin (UCD) - Institute for the Study of Social Change and London School of Economics & Political Science (LSE) *Date Posted:* August 10, 2006 *Last Revised:* August 10, 2006 Working Paper Series **41** downloads

APPENDIX 2

Manuscript of Dhammapada on palm leaves (source).



APPENDIX 3

EXAMPLES: terror, politics, China.

We still do not know how exactly life emerged and whether there is a single way to life. Yet we can observe the emergence of exystems out of very simple configurations in history of social, political, economic, and religious movements, of which Al-Qaeda and, more generally, Islamism, are the most recent phenomena.

3.1. Suicidal terrorism is the most mysterious phenomenon from the economic point of view. How can anything grow if the ultimate result is self-destruction? It can, if destruction is a business and production growth is rewarded in the economy of destruction. The reward, in deferred or immediate form, goes to the managers. It all looks like a typical Marxist model of exploitation.

An easy answer is that death is rewarded with entrance into paradise, but this goes against deep instincts of life. There is a high transition barrier to death. It could be overcome at high temperature, regardless the religious promise. The source of heat may come from the same source as the instinct of self-preservation.

As all exystems, Islamism (1) has a template to grow and restore lost parts in the form of doctrine and technical manuals and (2) consumes energy (money) and matter (humans, explosives, food, etc.). It essentially repeats the pattern of early Russian Communism, counting on human and monetary resources on global scale on the grounds of ideological solidarity. Fascism counted, for a start, only on its own resources and so did the contained Communism. Islamism, however, is the first totalitarian movement in possession, actual or potential, of large resources of all kinds, including not just mineral fuel, land, and human sacrifice, but also Western education and technology.

For a Westerner, probably, it is as hard to imagine the intimate mechanisms of life in closed Islamic societies as it was to understand life without private property in Communist Russia. I could easily recognize the familiar totalitarian spirit of fundamentalism in any religion, but until I had started reading post-9-11 books on the subject, I was, like everybody in the West, even the always sanguine Thomas L. Friedman, baffled by the scale and brutality of violence. The mass murder-suicide must require an extremely high generalized temperature (i.e., instability) to overcome the transition barrier. Although there could be exceptions, I believe that this temperature comes from a culture in which large number of idle young men are separated from young women, which must be a source of constant instinctive stress. Thinking about the anti-growth, I feel a certain trepidation about the consequences of a separation of large number of young modern men from their gadgets. God forbid, anti-growth becomes an orthodoxy!

Looking at the spread of Islamist violence, I begin to think that the Western sexual revolution has been the major contributor to the overall loss of spiritual pride and strength by the West, growing reliance on technical means of warfare, political correctness, constraints of "clean war," and defensive liberalism. It is good to live in this kind of society, but only behind the doors closed from the world. I begin to understand why any fundamentalism, including Christian Right, starts with separating the sexes and promoting chastity: this is the beginning of an army of angry and, if so ordered, violent young men. I begin to think that when Zbigniew Brzezinski frowns at the American hedonism, he understands human nature, values the American way of life, realizes the threat to it, and wants to preserve it for as long as possible.

The rise of Islamism had its grand opening right before my eyes and is, unfortunately, a good example to test the chemist's view of the world. The first in sight is the need to stop the threatening growth while the new exystem is small and unstable. The American democracy, as well as the rest of the world, is undergoing an evolutionary change, which is an even better and worthy test pad for the pattern ideas.

3.2. Political parties in America, it is my intuitive assessment, have been growing in power, i.e. the ability to cash big checks for a single goal. The goals of both American political parties are sharply focused on single issues and names, which makes the use of money in electoral campaigns relatively effective, especially for swiftboating, for the winner, of course. I do not have, however, any facts to substantiate this my rather venomous statement. But I can add even more venom: only the goals of mafia seem to be as narrowly focused as the goals of electoral campaigns.

My personal impression of American political evolution, which I have been observing for 20 years, is the increasing centralization of power. It begins with the centralization of power within political parties, of which there are only two—a very small system, vulnerable to chaos. I see it as *sovietization*—demanding the Surgeon General to mention President Bush at least three times for a page as if He were Stalin or Almighty is the best illustration.

> Dr. Carmona said he was ordered to mention President Bush three times on every page of his speeches. He also said he was asked to make speeches to support Republican political candidates and to attend political briefings. (Source).

This effectively refreshes my memories of Soviet life. Nothing bothers me as much in American political life as the all too familiar party discipline.

> The term sovietization (Results **11 - 20** of about **76,800** for **sovietization, 7/19/2007 9:04 AM)** is not my invention. It is used in a variety of meanings. "Sovietization of America" (Results **1 - 10** of about **1,870** for **"sovietization of america"**. 7/19/2007 8:59 AM**)** is seen by one correspondent as:
>
> > The Sovietization of America continues.
> > Ideological purity and Loyalty to the Party trumps all.
> > Posted by: Doyle on December 2, 2005 1:32 AM

3.3. China is the most interesting historical laboratory of anti-growth.

The interplay between growth and resources creates a particular history. Thus, America owes in part its history to immense land resources that seemed endless and China to its fertile but limited ones. America began with scarce European population and China has had large (but fluctuating) population throughout its history. China exports it enormous workforce without even moving people, and the United States imports brains from China together with their bodily encasings because America has been losing the ability to grow their own.

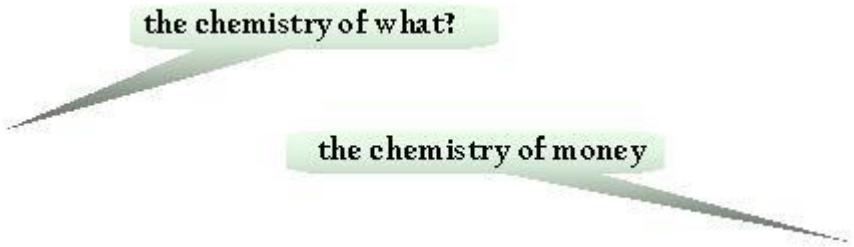
Alexis de Tocqueville left us the following image, which we should not judge for historical truthfulness:

> The nation [China] was absorbed in productive industry: the greater part of its scientific processes had been preserved, but science itself no longer existed there. This served to explain the strangely motionless state in which they found the minds of this people. The Chinese, in following the track of their forefathers, had forgotten the reasons by which the latter had been guided. They still used the formula, without asking for its meaning: they retained the instrument, but they no longer possessed the art of altering or renewing it. The Chinese, then, had lost the power of change; for them to improve was impossible. (*Democracy in America*, Volume II, Chapter X)

In modern times China has been experimenting with both forcefully boosting (Mao rewarded fertility) and limiting the growth of population (one-child policy). History of China has also other examples of conscious anti-growth. The outcome of the Chinese experiment in orthodox anti-growth seems to become the country's major problem in near future.

2007

Essay 55. The Chemistry of Money



SOURCES

Money is the most common area of everyday human experience. It is hard to believe that we could differ on money issues, yet even the professionals disagree. One of possible reasons is that money has been evolving, like any other life form, and never before as fast as today. Another reason is that by money we mean different things, from one cent coin to the ultimate meaning of life and to the root of all evil.

When I read about economics, money, and inflation, I can learn to some extent how economists see the world of money—and they shout and whisper about it in a pandemonium of voices—but I am still entitled to my own point of view. Since I was born into the world of money (not to be misunderstood!), to talk about money is my birthright. Moreover, I spent long stretches of time in Soviet Russia when money mattered very little, and my vision could be sensitized by life without money as it would be by life in darkness.

This Essay completes the triad POWER—GROWTH—MONEY, my personal sacrifice on the altars of the three most cherished gods of our secular Pantheon.



A lot of related thoughts are scattered over other **Essays**. The issues related to Pattern Theory, structure, novelty, transition state, kinetics, catalysis, energy, stability, complexity, and the generality of chemical vision are repeatedly discussed in **complexity**.

The voyage into the realm of money is for me a dangerous lonely adventure. I have to suppress my fear of making fool of myself. I have no companions to plug their ears

with beeswax. To hear the authentic and unadulterated money song, I tie myself to just three sources, none of them written by an expert in the subject.

Source 1. Mark Hammond (philosopher) , *A Heideggerian Phenomenological Investigation of Money* , The Edwin Mellen Press,2001 .

I had run into this book (which is Volume 51 of *Problems in Contemporary Philosophy*) by pure accident and it was an exotic, disturbing, but rewarding reading. I learned why philosophers used to avoid the subject of money, how money is involved in the future evolution of humans, and about the suffocating effect of money on modern philosophy. I better understood—without any affection—Heidegger, a dark figure of modernity. Hegel, who had looked high above his head, accepted the world, as much later did Francis Fukuyama, who was just looking around in his office, and so did Heidegger, looking under his feet.

The book reinforced my belief in the value of philosophy (see **Essay 29**). It also directed me to the next and most important source, the centennial anniversary of which is well worth celebrating.

Source 2. Georg Simmel (sociologist), *The Philosophy of Money* , **1907** (second edition, translation: Routledge, 1978)





The style and even the look of the first chapter reminded me of various solid objects from paperweight to blind brick firewall. I thought that Simmel's unique *The Philosophy of Money* would be a tombstone to long gone times.

Simmel's paragraphs could go for three pages uninterrupted. Yet very soon I saw a multitude of windows opening in the brick wall to let the brilliance, inspiration, and imagination out, as in the section *Exchange as a form of life*, where the author, among other subjects, investigates the economics of a kiss with full freshness of a witty piece in *The New Yorker*. Then the brick wall would close again until the next outburst of intellectual vigor. The last three quarters, more lively and essay-like in style, made me completely forget the density of the text, and if I saw bricks, they were of gold.



Reading Simmel, I could feel the consistency of Simmel's concept and its closeness to my own chemical vision. I often felt that his book was, in fact, a **natural philosophy** of money, i.e., the attempt to be as close to observable reality as possible for such a mystifying subject. I would even call him "materialist:" he received his doctorate in 1881 for his thesis "The **Nature of Matter** According to Kant's Physical Monadology". His example with overcooled water that turns into ice at a slightest touch (p. 269), makes

me think that his interests were truly all-encompassing. He believed in the absolute unity of nature, from physics to intimate love, which he occasionally substantiates as a philosophical principle: disparate things are united in human mind. He wrote as much an encyclopedia of money as a **sociology of individual**, however paradoxically this sounds. He himself noted that telegraph would be absolutely useless for a lonely individual (p. 129). I admire his idea that only when you pay with money, you are really free (p. 285). Having said that, I insist that when everybody pays with money, nobody is free. Freedom is priceless because, along Simmel, freedom means being yourself: but what a small prison cell!

Source 3. Jack Weatherford (cultural anthropologist), *The History of Money,* Crown Publishers, also Three Rivers Press,1997.

This compact, lively, and focused popular book rises fundamental questions about the modern monetary system, but I suspect that today nobody knows which of numerous answers is true.

There is a large number of excellent Web sources on money, but I have managed to stick to my choice. Once, however, I was almost seduced by David Hume, who wrote in **1752**:

> Manufactures, therefore gradually shift their places, leaving those countries and provinces which they have already enriched, and flying to others, whither they are allured by the cheapness of provisions and labour; till they have enriched these also, and are again banished by the same causes. (David Hume, *Of Money*)

The concise and far reaching description of globalization tells me that, regarding money, nothing is outdated and my three sources are as good as other three hundred.

Both Simmel and Weatherford convinced me that the very essence of modern money emanates from our trust in an institution, whether it was the Bank of England, or is Federal Reserve, or the Government (which we in America never trust), or, in the future, the Western civilization itself (which we do not have guts—or wits—to defend). Electronic money, which Simmel, speaking of telegraph, anticipated, means the end of the world as we know it because it **privatizes** the power to interfere in **private** and corporate lives, formerly in the hands of the Law and Order, to unprecedented but still not known extent. What Simmel only vaguely anticipated, when he made qualitative distinction between big money and small money, was the power of money in politics. Mark Hammond ends his book with a warning from a different, more troubling, but in essence similar perspective that elevates interference to the rank of control.

I will further recur to Simmel's eloquence to adorn my own reflection, but I wish I could someday expand more on the above books. The last one is for wide audience, with some extravagant gastronomic excursions, but I am afraid the first two are for intellectual gourmets only. Both bear the imprints of authors' complex personalities. Anyway, I enjoyed laboring through them.

I feel sorry for people addicted to tourist travel, which is nothing but an enhanced reality TV, while there are whole new continents of novelty and excitement, easily accessible from a comfortable chair, and, oh, so enjoyably hard to cut your way through their intellectual jungles. You need to really sharpen your mind blunted by travel agencies. All right, I am taking back my words. You need a rest from the grueling toil for money and what can be a better rest from earning than spending?

A THRIFTY INTRODUCTION INTO THE WEALTH OF KNOWLEDGE

I need to start with an introduction regarding my understanding of science in general and chemistry in particular, but I will be brief.

SCIENCE (in less than 200 words). I distinguish between simple and complex systems. The science of simple systems—moving point, hydrogen atom, protein molecule, reflexes of a mollusk, behavior of large crowds—could be itself complex, hard to understand and use, but it achieves a high degree of exactness, consensus, and predictive power. The science of Complex Evolving Systems, which I call **exystems**—geology, climate, life, mind, society and all its outcrops, history—might be more accessible to laypersons, but it is neither exact, nor consensual, nor predictive, at least not as much as exact sciences.

But how much? I think that we might be successful in using scientific method for exploring the borderlines between what we can know and what we cannot.

We might well find that the area of relative predictability, the **oikoumene** of certainty, is quite large and it hides even an island the size of Greenland, still as much bare. I would give the island of the not yet existing **science of evolutionary novelty** the name of **neology** (although it is used in linguistics) and I even believe that the all-embracing economics, a hybrid of science and fiction (which justifies the Nobel Prize), could be the right quadrant of knowledge to accommodate it. That will do for **SCIENCE**.

CHEMISTRY (272 words, but we are already on the money). It is a science about transformation of structure. This immediately brings us to the way chemist sees money, so to speak, with closed eyes. Here it is, my mental frame for the picture of money, in which **Ba** is buyer, **Se** is seller, and **Me** is merchandise (not money!). But where is money? Money is invisible. It is abstraction, like energy **E** or temperature **T**.

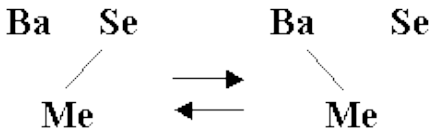


Figure 1. Change of the structure of ownership. Ba: buyer, Se: seller, Me: merchandise

Chemistry studies the change of energy during transformations of structure and derives from it **timed** predictions, or at least explanations, about the outcomes. It tries to tell us tells us **when** something happens.

The CHEMIST is somebody who answers, among others, the following questions:

1. What is the initial structure?
Usually it is known, and if not, it can be analyzed.
2. How can the structure change?
There are often several most probable ways and a lot of improbable ones.
3. What is the fastest change?
The fastest transformation may produce the main result, at least in the short run.
4. What is the final result?
It is usually a mixed bag, but the main result or two can be approximately predicted.
5. Is it possible to push the transformation in only one desired direction?
Very often, yes. Thus, life exists because the enzymes accelerate only one transformation each, out of enormous number of possibilities.

The swiftboating of John Kerry during the election campaign of 2004 (and other tricks) worked as an enzyme, too, accelerating George Bush toward the classical mixed-bag outcome sorted out by the Supreme Court.

From this we can see that chemistry is not just about molecules (Ulf Grenander likes to say that mathematics is not just about numbers).

That will do for **CHEMISTRY**.

NOTE: I do not advocate application of chemistry to human matters. I advocate the inclusion of chemical ideas into a general framework of complex systems, in a way similar to the use of physical ideas in economics through econophysics. As it is becoming clear, econophysics is much more general than its applications to economics. The same can be true for chemistry of evolving complex systems. Besides, the border between physics and chemistry is fenceless. The indigenous concept of chemistry is not so much structure as **individuality,** which is the central and treasured concept in human matters. The crowds are the subject of econophysics.

Energy comes next. This is a complex, tangled topic, dangerously so in times of energy crisis, when it is exploited by politics. There is a lot on the Internet, but one excerpt will do the job of cutting the Gordian knot:

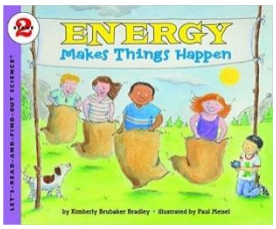
ENERGY (in 17 words).

The fact is, *no one knows what Energy is!* Get that! No one knows what ENERGY is!
Dave E. Watson

That will do for energy



I strongly and completely seriously recommend this source for both young and seasoned non-tech Vikings of neology because it contains the best popular introduction into energy that I know. FT stands for flying turtle. The entire FT EXPLORING site is great.



By Kimberly Brubaker Bradley (2002)

That will do for **ENERGY**, but only for a beginning. Energy makes things happen (many people said that), but one basic question still remains: happen **WHEN**?

The first hint of the answer had come from physicists only around 1930, after which chemistry began taking its modern shape.

WHEN (Slightly over 180 words)

The question WHEN? is typically chemical. The aspect of chemistry dealing with timing of events is called kinetics. But kinetics, although rooted in physics, is an indigenous chemical subject, closely tied to mechanisms of chemical reactions. Its generality is obliquely illustrated by the article Chemical Kinetics in Wikipedia, which does not contain a single chemical symbol. Take any good non-postmodern novel: it shows, step by step, the way from the beginning of a some unusual events with a bunch of humans to their not quite expected end. This is what is called mechanism in chemistry. A description of a historical battle, reign of a king, or revolution by a historian are presentations of mechanisms, too.

I see general kinetics as the main foundation of neology. Its main ideas come just from common sense, but one sounds more technical: the stable initial and final states in a chemical reaction—as well as in making a life decision, conducting market transaction, running a revolution or reform—are separated by a transition state which is more unstable (improbable, stressful) than either of the outermost states and therefore is short-living and transient bottleneck of the entire process. *Hamlet* is a play about transition state and pure human chemistry.

There are two basic situations, shown in **Figure 2**.

The lower the transition barrier, the more probable the transformation of **I** into **F**. For statistical ensembles, as in large volumes of molecules, consumers, voters, or traders, it translates into the speed of the overall process. We can say the same about the reversal of **F** into **I** , but only about molecules. In real life, you can return a dress to the department store, but not if it is stained, you can vote for George W. Bush, but not revoke your vote in horror. Returning a consumed turkey sandwich is out of question.

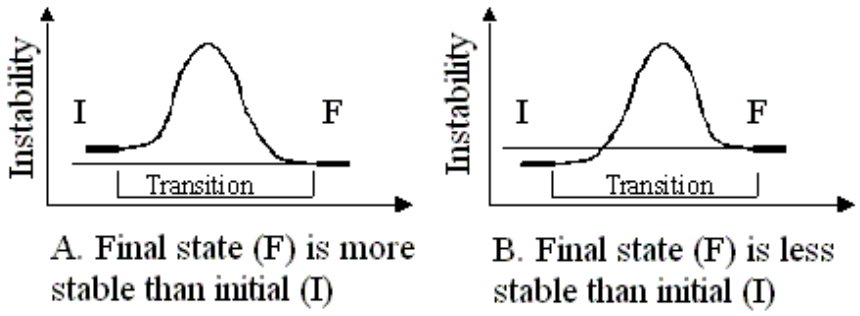


Figure 2. Transition, transaction, transformation, change, exchange, life

That will do for **WHEN**.

If we come back to **Figure 1**, I hope its invisible part will be now seen: the buyer, the seller, the merchandise, let us say, a new car, are the same right after the deal, but the value of the car has dropped in an instant (or will drop soon), and the wealth of the buyer and dealer has changed, too, quite like energy in a chemical reaction. The structure of ownership is radically changed. For if nothing changes, nothing happens, and if something happens, there must be a **preferred direction of things** under the sun.

Next, I am going to give a chemist's account on money, but first:

PHILOSOPHY AGAINST FEAR

The tradition of Montaigne's *Essays* requires a personal openness. I compared myself with Odysseus not for the purpose of appearing heroic, but rather because of the superstitious wish to belittle myself in view of the enormous difficulties of the subject. Economics and finances have never been within the scope of my interests. I am looking for some protection.

In **Essay 54** I acknowledged the influence of Erwin Schrodinger on overcoming my fear of looking foolish. Another supporting hand is extended by Mark Hammond, who added the following to Heidegger's remark on the perils of philosophizing:

> For philosophizing to occur, we must, of necessity, stand on the verge of error. Although standing on the verge of error applies to everyone who tries to speak the truth about something, our case is slightly different. For, asking questions which the tradition has yet to ask, ensures that we will constantly be standing on the verge of error. (Mark Hammond, *A Heideggerian …* etc. , p. 13.)

Am I really philosophizing? Apparently so because I do not expect monetary rewards from my occupation.

> In short, philosophers in Antiquity saw philosophizing not as a job one did and could be paid for, but as a way of being. (Mark Hammond, *ibid*., p. 71).

I am simply going home. God, give me if not money then energy. Speaking of…

MONEY AND ENERGY

Money can be in the form of God knows what (economists are still uncertain) if it is electronic.

From under my fingertips, a series of electric impulses goes to Amazon.com and somebody there, not human at all, takes it as $43. "It" subtracts $25 of my earlier reward certificate. Moreover, "it" sends me not another series of flickers, but a new reward of $25 **in the mail,** which is good only for books at Amazon, but not for groceries at Stop&Shop. The mutual sniffing over and exchange of flickers between Amazon and my credit card bank goes somewhere behind my back. Anyway, I am pleased to have **earned** money (is it money?) **by buying** the books by Simmel and Weatherford. This is the new world, in which money is morphing so fast that economists cannot catch up with it. Of course, I am pleased by earning through buying because I am a simple animal whose primitive psychology is well known to the economists of advertisement.

Money and its carrier—paper or paperless bits of information—are two different things, but it is the visible money that overrides any abstract association with the word **money**. The reward certificate is also money with strings attached, and it would not be of any difference if it was just a number in computer memory, which it is. It is a strange money with a personal history, quite like a human being, and it even has a name: my name. Same can be said about the credit card: it works for me because it has had a life of its own. With the card, it seems, I reach into the future, but in fact, I live off my past. The flash memory stick with URLs, account numbers, and passwords is yet another form of money carrier, naked and unprotected from assault and theft. But all that is still not the powerful invisible substance of money.

We believe that money is something we can touch. It is the opposite with chemistry, the science of the invisible: we do not think about *real* atoms and molecules, which are the stuff of chemistry, unless it is absolutely necessary. The majority of chemists have never touched a single molecules or atom. A few could do it with a complicated instrument. The chemists deal with the structure, relation, and interaction of atoms and Georg Simmel saw society in this way. My act of exchange with Amazon.com corresponds to the collision of molecules in chemistry. This is how theoretical physicists find their way today into the better paid economics: market is similar to a chemical flask and, maybe, to a supercollider.

Physics, but why not chemists? Market erases individuality and structure and turns all participants into coins of the same currency, which is completely un-chemical. But physicists can play such games.

Obviously, there are two related but different things called **money**. One is money as information and the other is money as energy.

The Internet can make money as untouchable as molecules or the wind that filled up Odysseus' sail. Nevertheless, e-money performs exactly the same function as coins and bills. Moreover, the verbal promise to pay, a gentleman's word, can perform the same function, especially if witnessed. It seems that the advent of e-money elucidates the specific function of **cash money**, which is nothing but a piece of **information**, whether touchable or not. Through the Google goggles, it looks like that the perception of cash or quasi-cash money as information has not yet entered the financial mainstream and is rare even on the periphery, but it was expressed at least as early as 1997, and most probably earlier.

Money as coin, bill, reward, credit, etc., is information about and agreement between indefinite two, particular two, or one indefinite and one particular sides.

> Economic life is increasingly concerned with information. The advent of electronic money reminds us that money is information (see Chapter 4.2 (2)). It provides information about people's entitlements and obligations - a scoring system for regulating economic activities, transactions and relationships. ……..
>
> (See the end of the quotation in a green frame, next page)

This is not, however, the money that a philosophizing chemist could be interested in. Chemistry provides a basis for biochemical coding, but does not deal with information. Neither should I.

The other money does not need any coins and records. It is something that:

can exist in various forms,
is normally conserved in transaction, but can be lost (dissipated, degraded)
can be created in a cyclic process, using a source of energy
is difficult to measure, but easy to compare
can be transformed into physical work and back
needs a socio-economic machine for creation and transactions
sets the preferred direction of spontaneous events

This looks very much like energy, and if it looks, moves, and quacks like energy, it is energy. For more about parallel between energy and money, see **APPENDIX 1.**

Regarding the preferred direction of spontaneous events, Ludwig von Mises put it very simply:

> Every action is motivated by the urge to remove a felt uneasiness.
>
> Ludwig von Mises, Human Action, Chapter XIV. THE SCOPE AND METHOD OF CATALLACTICS, Section 1. The Delimitation of Catallactic Problems.

> Looked at another way, money is energy. Flows and stocks of money reflect and determine flows and stocks of economic energy.
>
> **THE NEW ECONOMICS OF SUSTAINABLE DEVELOPMENT**, by James Robertson, 1977

Money for a chemist is a **form of energy**. For a biochemist, **ATP**, adenosine triphosphate, is the energy carrier in living systems, the main coin in circulation. See **Essay 51**.

We do not know what energy is, but we know how it changes. In order to take energy out of the narrow physical usage, I prefer to use the term **instability** instead of energy, but **stress** would be even better. What we need is a term more general than both physical energy and socio-economic energy. This is how I would define it:

> High energy (high instability, low stability, high stress) means roughly that something is about to happen, although we may not know when, and low energy (low instability, high stability, low stress) means that a change is unlikely, although we do not know for how long.

This is what Dave Watson, Kimberly Baker, and others mean by saying that energy makes things happen. An additional advantage is that although there is no "unenergy," "inenergy," or "negenergy," we can use both **stability** and **instability,** whichever is more convenient, because there is only one scale for both. As far as money is concerned, it not only makes things happen but beats energy by buying it. Well, we can also beat money down by making it.

Chemistry approximates values of energy for a complex structure by adding increments for simple fragments of structure and their irregular interactions (see **APPENDIX 2**). Simmel, as if he were a chemist, explicitly suggests a summation of relative **values of desire** for both sides in the act of economic exchange.

The chemist tries to evaluate the overall change of stability of a complex chemical system by adding all expected changes, atom by atom, or bond by bond. Sometimes it is just a guesswork. The lucky circumstance is that **most atoms and bonds do not change** during

a chemical transformation. This is not so for a system like stock market, where changes can happen every minute at millions of points. The lucky circumstance there is that the majority of traders are simple unstructured creatures with a few statistically predictable properties, quite like molecules of gas. Nevertheless, both chemists and market analysts see only an approximate picture and are quite able to make mistakes. The difference is that chemists remember mistakes, record them in publications, and learn from them, while squawk-boxers, stump-screamers, and TV-gurus live by the moment (I might be wrong) and try to forget or hide their mistakes, which nobody remembers, anyway.

> **NOTE**: There is a proprietary (StarMine) system of rating the accuracy of analysts' estimate of earnings. The system shows only relative performances of analysts. "According to StarMine, consensus earnings forecasts are accurate to the penny only a small fraction of the time." (from Forbes ; StarMine, bought by Reuters , was a partner of Forbes). What about accuracy to one million? Where is the borderline between prediction and knowledge? Still, there could be a *chemistry* between an analyst and a company.

I have already discussed the basics of chemical and meta-chemical kinetics all over complexity and simplicity , and transition state is well presented on the Web. In a few words, the differences in stabilities of initial, final, and transition states are evaluated or approximated by the increments of structure change around the focus of change. Speaking of structure…

DOES MONEY HAVE STRUCTURE?

If not, chemistry would have nothing to say about money. See APPENDIX 2

It turns out, if we think about the data in Appendix 2, that structure is a much more abstract concept than chemical structure. This subject is of a high generality and of no direct importance to either economics or chemistry. In essence, it can be reduced to two points:

1. The direction of events in a system, whether simple or complex, is determined by the change in total energy (stability) along that direction, in comparison with other directions. The direction with the highest drop wins, at least, in theory.

2. The change in total energy (stability) is a balance sheet for all local and global increments of the points of change. Each time one sees a formula with the sum sign $\sum$, like the one below, taken from a work on economics, it is just a balance sheet.

$$B = \sum_{t=0}^{\infty} \beta^{t} u(c_t^i)$$

Therefore, the structure represented as points and lines is just a map of all local entries: points and lines, each with its increment into energy or stability. A chemist compounds a balance sheet for molecules, and anybody who studies the behavior of social and economic networks does the same, for as much as possible.

Structure is a measurable value that is a sum over its components. An accountant, unlike a chemist, sociologist, engineer, and architect, does not need to imagine anything visible as structure.

GEORG SIMMEL AND ECONOCHEMISTRY

I am pleased to give the floor to Georg Simmel himself. I am going to refer to him often because his book is a unique encyclopedia of money from a non-economic perspective and because he provides a reference point and background against which the evolution of money can be traced. Simmel was a keen observer of life behind the words, clothes, and makeup. He looked deep down to the bones to which the muscles of wealth are attached.

I completely share Georg Simmel's philosophical apology of relativity, the thoroughfare of his book. We do not have any absolute scales for social values because society is a complex, large, and labile structure. Chemistry, the science of structural complexity, deals with relative values like energy and stability, too.

Simmel notes that an object has an economic value only if there is some obstacle to possessing it. He calls this obstacle **distance**.

> Certainly, iron would not be an economic value if its acquisition encountered no greater difficulty than the acquisition of air for breathing; but these difficulties had to remain within certain limits if the tools were to be manufactured which made iron valuable. (Simmel, p. 72).

Further, he uses **barrier** on par with distance. Moreover, he mentions the intermediate stages between the desire and possession.

> In the first place, as we have seen, demand is not distinctly conscious unless there are **barriers**, difficulties and sacrifices between the object and the subject. In reality we exert a demand only when the enjoyment of the object is measured by intermediate stages; when the price of patience, the renunciation of other efforts or enjoyments, set the object in perspective, and desire is equated with the exertion to overcome the distance. (p.91).



Desire and distance

> The decisive fact is that practical economic value is never just value in general, but is by its very nature a definite sum of value; that this sum results from the measurement of two intensities of demand; that the form that this measurement takes within the economy is the exchange of sacrifice and gain; and that, consequently, the economic object does not have—as seems at first sight—an absolute value as a result of the demand for it, but the demand, as the basis of a real or imagined exchange, endows the object with value. (Simmel, p. 92)

Of course, there had been no modern chemistry when Simmel wrote his book: it emerged between 1930 and 1960. I interpret not his actual intent but the agreement of his vision with generalized chemical kinetics that speaks about height instead of distance. This agreement seems to me striking, but if there is chemistry in love, we should not be surprised to find chemistry in the love of money.

> For the object in demand becomes a value of practical importance to the economy only when the demand for it is compared with the demand for other things; only this comparison establishes a measure of demand. Only if there is a second object which I am willing to give away for the first, or vice-versa, does each of them have a measurable economic value. (Simmel, p. 91)

It is out of question for me to engage in extensive mining of Simmel's gold, but it is really amazing how modern evolution of money confirms his vision.

One example. The space, *der Raum*, so important for Simmel's picture of economic life and sociology in general, is not the vast open expanse, but more like the test tube used to bring the reagents together. The transportation, communication, and Internet have made economic space so topologically connected and so metrically **tiny** that every buyer is, ideally, within the reach of any merchandise and its seller.

Simmel makes it clear that distance is something that requires an effort to overcome, while, from a different perspective, one may see modern economic space as incredibly **big**. In the latter case, **big** relates to the size of the marketplace. Simmel, however, was thinking as a sociologist and for him the individual space was a kind of topological neighborhood. I would illustrate his **distance** with the 14 year long toil of Jacob toward marrying Rachel or the rich of "intermediate stages" journey of Odysseus toward the reunion with Penelope after his 20 year long absence.

If Simmel was acutely aware of the money as energy, and not just physical energy, he was in search of a word for what we today call without hesitation **information**. He called it "symbolic representation."

> The institution of money depends upon it [symbol] inasmuch as money represents pure quantity in a numerical form, regardless of all the specific qualities of a valued object (p. 150).

He struggles to express the power and immateriality of information in a broader aspect:

> The thought that has been once expressed can no longer be captured again by any amount of power in the world; its content is irrevocably the public property of all who apply the mental energy necessary to recall it. By the same token, however, once it has appeared, it cannot be stolen again by any amount of power in the world. Once expressed, the thought remains indivisibly bound up with the personality as a constantly reproducible content in a manner that has no analogy in the economic sphere (Simmel, p. 412).

Gradually, economy would "capture" information and put a price tag on it. By that time power would be measured in money, too. In totalitarian systems, the old-fashioned power of the stick would be able to "steal" information and even burn it in a book pyre. The split between hardware and software and their separation from human touch has been one of the biggest evolutionary novelties in history.

It would take too much space to discuss here Simmel's concept of structure, which is entirely chemical—it is based not on statistical parameters but on individuals, their bonds, and interactions—and makes him in my eyes the first econochemist. In his own words: "Society is a structure of unlike elements." This is pure chemistry. See **APPENDIX 3.**

Simmel has been well remembered by sociologists as the founder of social network analysis. After a century, during which economics has become the science of everything, Simmel has been re-discovered by economists. See, for example, Georg Simmel's *Philosophy of Money*: Some Points of Relevance for Contemporary Monetary Scholarship, by Richard E. Wagner.

Is there anything new under the sun, or, better, is there anything old? Speaking of…

FOUNDATIONS OF NEOLOGY

The fluid chemistry of money is inseparable from time. Money was the first—and still unsurpassed since its invention—technical means to control events distant in time and space. The money pouch carried a squad of invisible jinn that would do the job in faraway places without the owner moving a finger. Money was the first—and only—machine for teleportation and telekinesis. It was also the first—and unrivaled—time machine. Money created the first—and also unsurpassed—alternative to violence. Unfortunately, a stimulus, too. Money expanded the footprint of a single individual and became the size of his—or the number of her—shoes.

While we can move in space in all directions, time is a one-way road with many pitfalls. With a few coins in the belt the traveler had good chances to reach the destination.

All maps of the future lie, mislead, or make no sense. The great paradox of neology is that they are **all true**. This is something that only chemists can understand. The unwritten

principle of chemistry is that all possible chemical reactions in a given starting mixture—there could be millions of them—are possible and running concurrently. Only very few, however, run fast enough to be noticed.

Prediction of the future is one of the oldest (but not the oldest) professions. Can we spruce it up? To stretch the mini-skirt down to the knee-length? Make it reputable? Can we put any rational platform under the chemistry of human systems?

The shape and position of the instability curve in **Figure 2** is completely arbitrary. We cannot plot it even in chemistry, except for very simple cases. It should be perceived only as a visual metaphor for representing the transition in an X-systems. All we know are the **relative** heights of three points: initial, transition, and final ones. We can compare them in chemistry very accurately.

We never know anything for sure about the future and often even about the past and present. We can judge the future of complex evolving systems in terms of likelihood, not probability. Probability deals with well-defined systems, while future is never well defined. In well defined (closed) evolving systems, we can list all possible states, at least, in principle. In poorly defined (open) evolving systems we can always expect the unexpected, i.e., novelty. Probability of something that has never happened or even happened twice is for me like the division by zero. Probability is about something that has already happened **many** times.

The states of the system can be (1) more or less known, (2) imaginary or expected, (3) intermediate between (1) and (2). Our knowledge deteriorates with the span of the projection into the future, exactly as the beams of the headlights.

Seen from the present, future states of the system, realistic or hypothetical, can **appear** more or less stable. High stability means that the change is unlikely. Low stability suggests a probable change. There initial state (**I**) of the system is usually better known than the subsequent states. There is a partially known, or expected, or desired final state (**F**) of the system.

If final state **F** is more stable than **I**, the transition will be more likely than if **F** is less stable. And *vice versa*. This is a typical example of Simmel's relativism.

The concept of transition state attempts to answer the question: how likely is the transition from the initial stable state to the final stable state, regardless of whether the latter is real or imaginary?

Kinetics answers the question in the following way: between **F** and **I** lies the transition state **TS** which is less stable and more unlikely than either **F** or **I**. This is why not everything that can **possibly** happen**,** indeed **happens.** The change in X-systems can be reversed, but rarely.

The change with a lower transition barrier happens faster than the change through a higher one.

What happens between **I** and **F** is called mechanism of transformation. Sometimes we know the mechanism, sometimes we do not. It is usually short, fleeting, and, unlike clockwork, confusing. In terms of Pattern Theory, it is irregular.

Social chemistry, not yet existent, could use the above ideas for explaining social and economic change *post factum*, as well as for estimates of likelihood of future trends and events, but always with a margin of unexpected novelty. There could also be expected novelty such as development of some big technology or a collision with an asteroid.

The above outline is clearly and completely relativistic. We can approximately compare two states or pathways, but cannot extract any absolute kinetic knowledge from a single state or pathway. Obviously, our mind can do the job of evaluation and prediction without any conscious evaluation and comparison. We call it intuition.

What social chemistry tells us is what we already suspect: people with lack of imagination should never be national leaders (and yet we elect them and they inadvertently fail). As for intuition, I will not be surprised if the same principles are experimentally proven for the work of mind. The society of thoughts or, better, Marvin Minsky's the society of the mind, has an economy based on glucose, oxygen, hemoglobin, or ATP as money. Today it can be visualized, as in the curious Visualization of Brain Activity during a Monetary Incentive Delay Task.

See my own takes (1 and 2) on the competition of thoughts in the mind and on consciousness as a small hall of fame of the instant winners.

The word **theory** for a natural scientist implies that a theory can be proved, disproved, or improved. Different theories in natural sciences converge with time. I am instinctively against this term in social sciences and humanities I prefer to speak about understanding, framework, paradigm, viewpoint, platform, foundation, and principles. . The novelty of evolution leaves place for diverging, fuzzy, and incomplete "theories." But no **theories**.



The rest of this Essay consists of a few selected snapshots of money taken with a chemical filter from different angles. Unbound by money and respectability constraints, I will try to apply the above dry principles to a little more full-bodied picture of economic transaction.

NOTE ON ECONOPHYSICS

A lot of important but technical detail is involved in reasoning that generalizes thermodynamics over the evolving complex systems, including the market phenomena and human behavior in general. I have no choice but to ignore it here, all the more, many topics are beyond my understanding and very few are agreed upon by professionals.

Too much is expected from mathematical approach and physical theory, but much less from the chemists. Nevertheless, the way chemists talk about transition state is, probably, the most transparent, however narrow, window into the subject that has a long and rich history and itself is evolving.

There is a big body of publications on econophysics and a growing body of criticism around econophysics, occasionally derisive and cynical. I believe that econophysics is a right way toward **understanding** evolving complex systems in general, but it deals with statistical ensembles, i.e., crowds instead of individuals.

As an example, I can mention only in passing the works of Sorin Solomon and Peter Richmond who demonstrated the origin of power laws (Pareto distribution of wealth is an example) from multiplicative behavior, i.e., procreation, the fundamental property of biological systems. It deserves a closer look elsewhere. It continues the direction started by Manfred Eigen in the 1970's, although I am not sure the authors are aware of that. (Peter Richmond, Sorin Solomon, *Power Laws are disguised Boltzmann Laws*).

The main limitation of econophysics comes from (1) statistics, (2) equilibrium, and (3) reversibility. Apparently, this excludes not only the government and huge investment funds from the picture, but the world itself, with its wealth, misery, inequality, absurd, turmoil, heroes and villains, as well as the irreversible course of history. Yet if patterns are recurrent and reversible, there could be some generalized physics, in which I am by no means expert, however.

> **NOTE** (2016). Can we have a unified picture of the world? I believe we can if we develop an approach that synthesizes **generalized** versions of physics, chemistry, biology, psychology, social sciences, and humanities into a discipline that none of the professionals and grant funders in the listed sciences would recognize as his or her own area of expertise. Pattern Theory, Human thermodynamics, pattern chemistry, pattern history are, in my view, first attempts to look at the world as a whole and understand how it works even if we are unable either to calculate and control its trajectory, like we can do it with a little space probe, or agree on where should the world go.

The buyer and seller are individuals. They do not make up statistical ensembles in a **single** transaction with strong psychological undercurrents. Desire and need fluctuate and if the negotiations decrease the Simmel's "distance" enough, one fluctuation will do the job. This state of uncertainty, vacillations, and the final impulse to buy or sell is familiar not only to all stock traders but also to all shoppers and even the garage sellers, as well as

those who contemplate marriage or divorce. Instead of distribution in space, as with the size of corn kernels, we deal here with distribution in time. Still, although the personality profile could be partly compiled from a series of trades (or marriages and divorces), no single deal has any kind of statistics. It occurs in a very small social system, quite like quantum events with a small number of possible states.

Physicists, however, are the smartest people on earth and their trade is evolving. They could ultimately develop quasi-quantum econophysics, for very small systems, of which the Oval Office or Federal Reserve Board Room could be an example. That would be their contribution to cognitive sciences, econochemistry, and even philosophy still mulling over consciousness and free will. How would it look? Like a big MAYBE YES, MAYBE NO, but let us vote.



Figure 3. Small econophysical systems of great influence: Oval Office and Federal Reserve Board Room

The power of physics is not even in self-questioning, which is the general *sine qua non* of science, but in the unstoppable maniacal drive toward the ultimate reasons of things.

Today there is market for anything and science is also on the market. When physics—and science in general—gets entangled in economics and politics, kilodollar becomes as much a physical unit of measurement as kilojoule. Would that be a good deal for science? Speaking of…

GOOD DEAL AND BAD DEAL



The buyer's "exertion" toward possession

The instability of any single state, for example, the initial one, is meaningless unless we compare it with another state. There is no absolute measure of desire with a desirometer, although we can compare one desire with another. What Simmel calls **the buyer's "exertion" toward possession** is measured by the difference between the instabilities of the initial state and the height of the instability in the transition state. The final state can have the instability (dissatisfaction) either higher (bad deal) or lower (good deal) than the initial state and it can in turn become the initial state of the next transaction. Simmel's "distance" (barrier) is the uncertainty which the buyer (or seller) must overcome to either roll over toward the deal or fall back to the initial state. For a deal we have to add the instabilities for the buyer and the seller in each state. For the sake of simplicity I will talk only about the buyer, although there is an asymmetry between them (see text after **Figure 7)**.

The question arises: what makes the exchange system in the initial stable state roll over the barrier?

The energy "makes things happen" because energy is what changes when systems go from one state to another. From instability to less instability is the preferred direction of natural events, although in the phenomena of life it can go the other way. This is one of the topics to which the above **Note on Econophysics** refers, and there are some subtleties.

The answer is simple for molecules: their energy (instability) is distributed along a kind of an asymmetrical bell curve (more exactly, Maxwell-Boltzmann curve, see **APPENDIX 1)**. There are molecules that possess, for a short moment, the sufficient energy to reach the top of the barrier, from which they can slide either back or over the top. There are buyers that have enough **realistic desire** and means to reach the top, and we have to conclude that, because of the uncertainty, only a part of all potential buyers with the same desire and means will be able to pass over it. There is a very good reason to approximate the market by physical methods, as econophysics does, all the more, this is the basic principle of chemical kinetics.

Buyer and seller form a single system, exactly as Simmel saw it, and the superposition of their desires (whether linear or not) translates into the transition barrier (which we call price) that defines the outcome, but never deterministically, not even under the gun.

Since we do not know and not really care about the shape of transition, we reduce it to just three levels: initial, maximal, and final instability, **Figure 4**. What really matters is just their relative height.

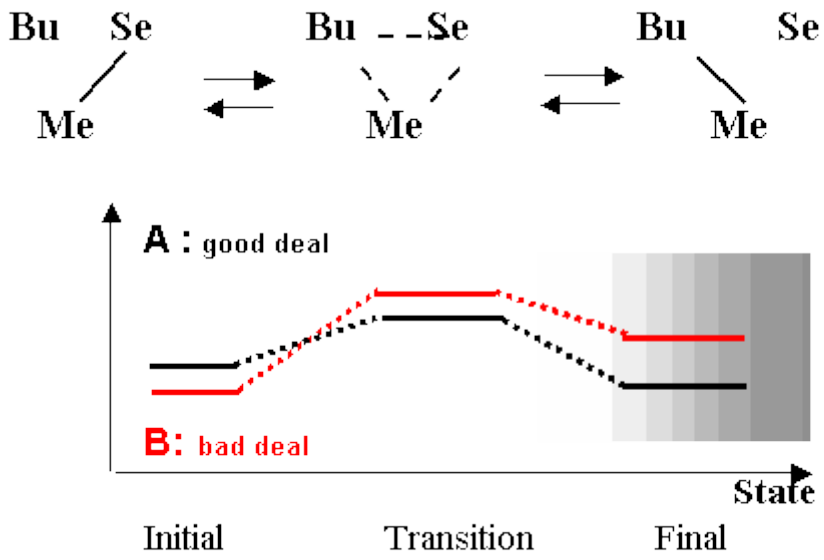


Figure 4. **The phases of transaction as seen from the present**.
Bu: buyer, **Se**: seller, **Me**: merchandise (goods, services, predictions, inventions, crime, punishment, etc.). The horizontal lines are the stability (satisfaction) levels.

The chemistry type symbols in figures mean: **Bu**: buyer, **Se**: seller, **Me**: merchandise (goods, services, predictions, entertainment, etc.). In the transition state, Buyer, Seller, and Merchandise interact in an unspecified way, typically, in negotiations or decision making, reversible up to a point.

Unlike the fleeting and usually unobservable transition state in chemistry, the negotiation could be recorded in full, sometimes by FBI, which promises valuable experimental data for the future econochemistry and "quantum econophysics."

In modern computerized information society the market change can be monitored in almost real time. Traders use the inborn ability of human brain to instinctively evaluate the coming events, as hunting foxes do. There are also various technical means to do that. But I am interested here not in the mass events, but in single unique acts of exchange. I do not deal with statistics and averages.

The final state in **Figure 4** is in the future. The increasing uncertainty is portrayed by the darkening gray area.

The transition state appears in this picture as a temporary and irregular configuration in which the bonds between the merchandise, buyer, and seller are captured in the moment

of uncertainty and can either advance to a new ownership configuration or to drop back to the old one.

Both buyer and seller expect to achieve a final state which is more stable than their current (initial) state. If not for the transition barrier, the deal could happen immediately, and it often happens for the buyer with big disposable income, which guarantees the predictability of the near future and insignificance of possible loss. The fast direct deal is out of the question for the buyer with insufficient money. For the middle buyer, the transaction should be weighed against the income, necessity, competing needs, and pure irrational desire. The overall incentive for the deal, regardless of details, is the expected drop of instability after the purchase, which would quench the desire.

The main increments of the transition barrier are relative cost (money factor) and additional indecision (mind factor).

There is a huge, fundamental, dramatic difference between the world of molecules and the world of exystems. Molecular transformations, i.e., chemical reactions, are **in principle reversible**, while the transformations of exystems are **in principle irreversible**. This is why any final state in chemistry can become initial state and back zillions of times and the system comes to an equilibrium. Unique exystems, however, undergo a certain particular transformation only once in their lifetime. By definition, new things happen only once. After that, they happen, if ever, as old things.

> **NOTE:** The complicated subject of the future is central for neology. Obviously, we often know what can happen in terms of a pattern. Otherwise we would not have desires and dreams. We know what to desire.

I see the change in terms of ideograms, i.e., templates for a pattern. This is the most unusual way of looking at things outside chemistry, but I expanded on patterns dozens of times in complexity.

In rigidly regulated societies the patterns of the future would be all known. We can hardly find today such society. In the intense economic and political life, the level of noise, or, to put it differently, degree of chaos, for which the term temperature is most appropriate, can wake you up of your dreams any minute. This is why I see neology not as theory and not as art, but as investigation of the outer borders of knowledge by a pursuit of patterns. On the one hand, we can predict the **different**, but not **the new**. On the other hand, whatever we can predict, the accidental external events can change it.

Economy is a perpetual dawn. Soon after the deal, the dark dreamy area of imaginary future, the farther the darker, makes first steps into the light of the present. The reality may be different from expectations because of the nature of X-systems. They are always in flux. Besides, the errors of judgment regarding the past and present can become evident. The final state may become less stable than the initial one. We know the conditions of the deal, but as soon as we are behind barrier, the future brings an increasing amount of surprise. What we saw as a good deal may look later as a bad one.

The same applies to an individual seller, although it could be somewhat different with corporate sellers and their non-negotiable for the day prices. Corporations have the power of slowing down the future and smoothing its uncertainties in the same way the coins served ancient travelers.

The surest way against failure **appears** to be growth, see **Essay 54. Growth and anti-growth**. Mergers and acquisitions are **expected** to bring size and all kinds of competitive advantages. On a larger time scale, this may look exactly as **Figure 4** with the same range of outcomes. Examples abound, the story of Lucent is one of them.

Then why are we alive if the instability profile of biochemical cycles is exactly a sequence of states separated by transition barriers? Who or what invests in our lives? Why isn't our life too bad a deal, anyway?

The answer is in the question: the key word is **cycle**. The same applies to economy. This, however would be too much for this Essay, but see **Essays** 51 and 52.

Nevertheless, I am tempted to formulate the answer in the enigmatic Delphic manner:



Αλλ λιφε φρομ σεαωεεδ το εκονομυ κυκλες ον συνλιγ-τ ανδ ιφ νοτ ον κασ- θεν ον κρεδιτ.

Which, translated from fake Greek, means:

All life from seaweed to economy cycles on sunlight and if not on cash then on credit.

Speaking of…

THE CHEMISTRY OF CREDIT



The most conspicuous barrier toward the deal on the buyer's side is the cost. It divides the potential buyers into (1) those for whom the deal involves a small part of disposable cash, so that they would not fret about it, (2) those who do not have enough and would not even think about buying, and (3) those who are in between and have to do some calculations, whether numerical or intuitive.

The lives of many people are absorbed by such evaluating, weighting, calculating, and reducing of qualitative values to quantitative ones. (Simmel, p.444)

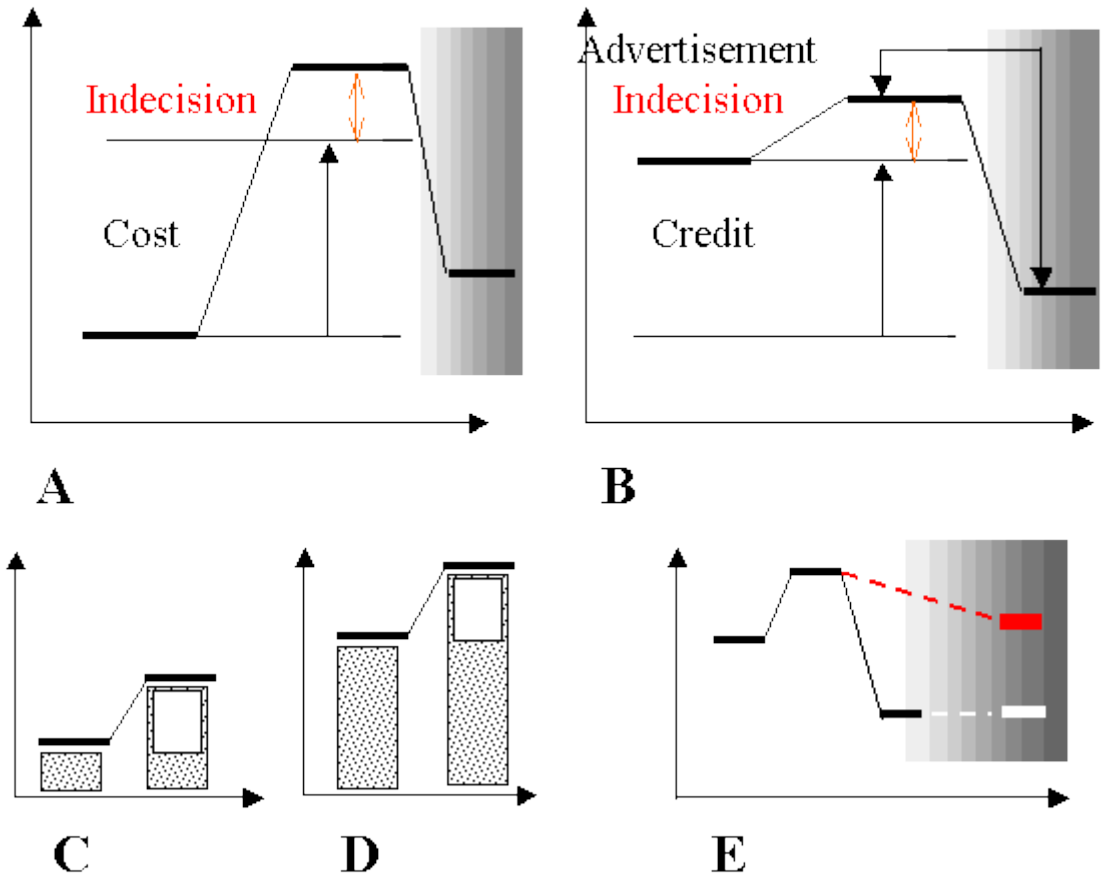


Figure 5. Credit extends transition state and makes it more accessible. The buyer's rumination adds another increment to the height of the barrier: the increment of indecision, Figure 5A.

Figures 5C and **5D** show the relativity of the barrier height.

The uncertainty of the future is already implied in the very notion of action. That man acts and that the future is uncertain are by no means two independent matters. They are only two different modes of establishing one thing.

Ludwig von Mises, *Human Action* (first edition: 1949), Chapter VI. UNCERTAINTY , Section 1. Uncertainty and Acting**.**

I do not need to go into details of this process of decision, but it is essential that it can be frustrating not just because of vacillations ("she loves me, she loves me not"), lack of exact knowledge, and. most importantly, the interdependence of numerous factors, for example, other planned deals, future needs, prospects of employment, etc. The moment comes when the internal instability overcomes a certain threshold and the buyer finally decides, still capable of reneging.

For many chemists the picture would immediately associate with the act of a chemical reaction between individual molecules. They will react if their total energy exceeds a certain level: the activation energy, i.e., the barrier between two stable states, see **APPENDIX 1**, **Figure 1A-1**.

This is probably what free will is about. The phenomenon of free will requires two conditions: a barrier and internal fluctuations of the desire to jump over it. There is no free will either in rolling downhill or in a mechanical device. Freedom to select from a menu is yesterday's leftovers of freedom.

Figure 5B very schematically illustrates the effect of both credit and advertisement—the omnipresent snapping jaws of consumer economy. They squeeze the barrier from top and bottom.

Advertisement is pure information and works as a catalyst in the sense that it is never spent in the act of its participation. Credit is a more mysterious thing: it is a money-making machine for the creditor—not so mysterious in thermodynamics of X-systems.

The desire is immediately satisfied with the completed deal, although the burden of the credit may somewhat spoil the pleasure. As **Figure 5E** illustrates, the projected level of instability (white line) can turn out well below the actual stress (red line).

What is never mentioned, except in the finest print of ads, is the inherent uncertainty of human life depending on thousands of personal and impersonal factors. This dark area of uncertainty exists for both buyer and creditor, and growth , production, and selling is the only natural insurance, if not the contractual insurance for sale, which adds the cost.

Georg Simmel returns to this idea repeatedly: big money and small money are qualitatively different things.

If I am not mistaken, this is something quite alien for classical physics (but less so for chemistry and not at all for philosophy). It is certainly alien to both physics and chemistry in one particular aspect: they deal with phenomena that repeat themselves within the overall time of observation. Since they are repeatable, both initial and final state are known in advance. In natural science **the final state is as much past as the initial state.** The reason for that is not so trivial: the nature is much slower than human history.

In human matters, the future is only partially known, or not at all if it hides an important novelty. I will give an example from my personal (not unique) experience. After the Katrina hurricane of 2005, some home insurance companies hiked the rates and in some instances dumped whole coastal areas off coverage. Katrina was the big novelty. The hike itself, its timing, and reasons were unexpected. But the pattern of hiking the rates under some pretext was, of course, not new.

When in 1987 I had visited New Orleans, knowing very little about the city in my first year in America, I noticed from Jackson Square a strange rampart. I could not believe my eyes when I climbed the embankment and found the river well above the ground level. My first thought was that sooner or later the city would be flooded. The question was only: when? Unfortunately, it happened in my lifetime.

Figure 6 shows the chemistry of credit (**Cr**) in more detail.

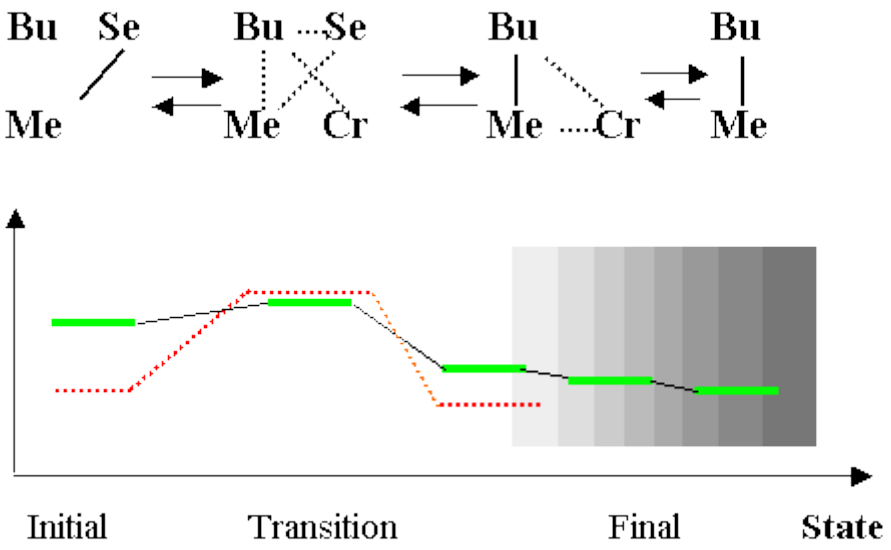


Figure 6. **Credit extends the dark area, but pushes it back.**

Credit makes the transition state so flattened that the change of ownership becomes a kind of natural rolling downhill. As a trade-off, the final state looks like non-final for a long time. Credit extends uncertainty over long time, which means (another delicate physical subject) the decrease—declawing—of uncertainty. In physical terms, it looks like the increase of social effective temperature (see the left column of **Table** in **APPENDIX 1**).

High effective temperature means that the amount of energy needed to perform the same amount of work increases.

NOTE ON ENTROPY

Here is just one formula that cannot be avoided for physical and chemical systems:

$$\Delta G = \Delta E - T\Delta S$$

Its hypothetical generalized interpretation is: to perform a change, we need to supply Gibbs free energy , **ΔG** , not only for work, **ΔE,** against forces , but also **TΔS** for creating specific order **ΔS** . The higher the temperature, **T**, the more additional energy is needed to complete the task. **Δ** is a symbol for change, **S** is entropy, the measure of disorder. Humans and animals get their **G** from food. Industry gets its **G** from humans and mineral fuel. The cell phone gets it from the battery. Plants are lucky to get it from the sun. Food and fuel cost money. Sunlight is free but the weather is capricious. When we decrease chaos, **ΔS** is negative and **– TΔS** is positive. When energy is consumed, **ΔG** and **ΔE** are negative. **Ordering, however, cannot be spontaneous**. For creating and **increasing order**, which is the purpose of society, economy, and government, **ΔG = ΔE + TΔS**. No more space for details here, but an illustration follows.

Suppose, two symbolic "molecules" of different shapes, chaotically moving in space, are reacting with each other as in **Figure 7**. For the transition state to form, they have to overcome the uncertainty of mutual orientation. This requires some extra energy, which increases the height of the transition barrier. For two squares (**7B**), the mutual orientation is much less important than for more **selective** 7A because there are four exact orientations for the green square. For the blue shape in 7A only one is exact. The red squares have four exact orientations in both A and B cases. The decrease of entropy (increase of order) , **TΔS** , in transformation A is higher than in transformation B. The higher uncertainty of A must be compensated by a hike in **ΔG.**

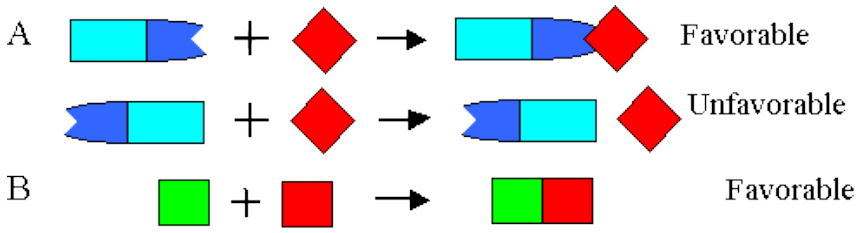


Figure 7. Entropy factor

There is an entropic asymmetry between buyer and seller, which is close, but not the same as information asymmetry known in economics. The shopper could be lost in the maze of the supermarket with 60 kinds of mustard, but the manufacturer knows well what to do with 600000 of identical filled-up jars. Information asymmetry relates to market data

The buyer assembles his desire from many preferences, rational or not, while the seller thinks in terms of money, i.e., hard cold number. The ruminations of the buyer include multiple choices in dealing with the purchase and its consequences. The purchase has an uncertain future. The seller already accomplished his act. The buyer only begins her test. The money-making machine works only for the seller. On the market of rarities, the buyer can resell the purchase later, for a profit. This asymmetry between buyer and seller creates the irreversibility of growth. It is one of the basic principles of money-making machine. Of course, a transaction could be a matter of life and death, but not in normal conditions.

David Hume compared money with "oil which renders the motion of the wheels more smooth and easy" (see **APPENDIX 4**). For a chemist it translates not so much into the chemistry of oil as into **catalysis**. Catalysis assists in smoothing the bumps along the way of a chemical transformation. Credit definitely smooths the bumps of economy, which only confirms that the essence of money as credit. No wonder, because economy is a life form and we, humans, are too. See Pythia's answer at the end of *Good Deal and Bad Deal* section. Another question I would like to ask the oracle is…

WHAT IS INFLATION?

Inflation (**Figure 8**) has always been a mystery for me. When I came to America in 1987, apples at a Dominic's supermarket in Chicago's Rogers Park cost 99 cents. It looked to us, new immigrants, outrageously expensive. In small shops on Devon Avenue apples could cost 29 cents. Twenty years later, apples in our local supermarket can cost the same $0.99 even off-season, but they could not be found anywhere at $0.29, and $1.49 is a common price even in the season. It still looks expensive, but only because of the imprinting of my first days in America. Our first car, dirty and worn out Mustang 1980, unsafe on a curve, cost us $1000. It was practically a gift. The cars cost more and more, but they seem less expensive than twenty years ago.

As a non-economist, I weigh less than a pound of apples in such matters as inflation . Nevertheless, as a breathing molecule of economy, I have my own molecular perspective.

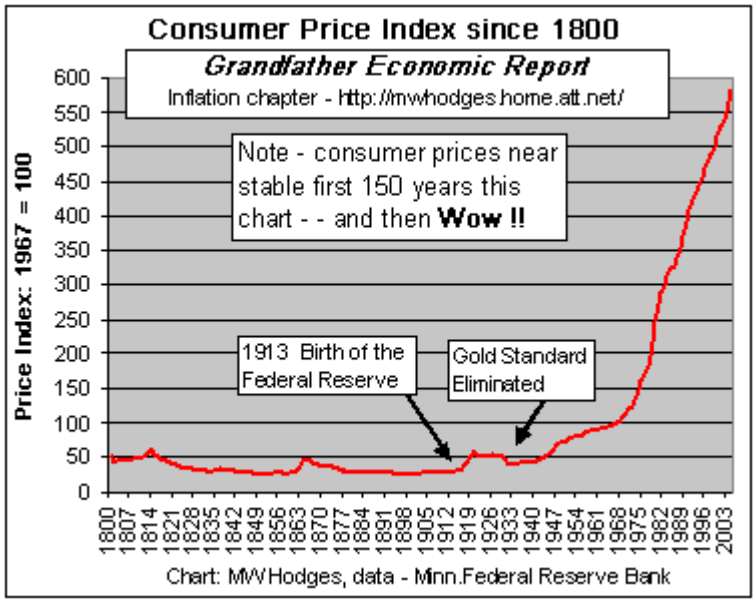


Figure 8 . Inflation. What happened after 1945? Around 1970? The answer could be in the question (source).

I am satisfied with the explanation of inflation in Jack Weatherford's, *The History of Money* : it was because of the elimination of Gold Standard. There are quite a few of other theories, and I am aware of most. I am sure they are all true. I am absolutely free of any ambition to make a contribution to theories of inflation. I just want to share my personal vision in an essayistic manner.

The persistent inflation started around 1947, i.e., after the end of the WWII. The nuclear threat, large armies, de-colonization, and the Cold War resulted in a large amount of uncertainty. Since that time, the explosion of **new technology** has been sustaining a constant uncertainty about the very **composition** of the market: what else will be invented and offered for sale tomorrow? Will the typewriter be alive next week? Inflation reflects the price of uncertainty passed, as all costs, to the consumers, whether corporate, public, private, individual, or the government. Political frictions and election campaigns blown up by TV introduced even more high stake uncertainty. This is my private opinion.

NOTE (2016). Robert Reich in his *Supercapitalism* (2007) attributes the emergence of the new kind of capitalism around 1970, to new technology. As a pattern chemist, I am looking for the most general and universal pattern covering the particular events. At this angle, what happened was a switch from the past experience as the only source of our understanding of the world and calculating the "balance sheet" of the future, to calculating and managing the future *per se*, basing on our assumptions about it and relying on our newly acquired ability to perform massive calculations overnight, as if the prediction of the future were proven possible. We had resurrected

> the ancient Roman profession and institution of augurs. The money tomorrow became more important and desirable than money today. As result, the future began bringing us huge and unpleasant surprises. The beautiful ducklings were turning into ugly swans. I believe, however, that although we cannot predict the future with desirable accuracy, we can understand it not by calculations but by using a repertoire of patterns and rules of their change. That humans are a kind of Things and Things are a kind of humans is just one example of such a pattern. By warming up to wild animals and identifying us with domestic ones, we are making the first step to a new, less idealistic and anthropocentric understanding of how the world works. But how exactly? Here is just one possibility: toward unification (spread of authoritarian regimes), standardization (all Things speak the same language), and—who could imagine it today?—simplification (all teenagers want to be iPhonized down to the common denominator). We are in a transition state. But the other possibility is the opposite of the first, however improbable it looks today.

Life is full of uncertainty, to which humans have adapted and some even developed a taste for risk. The problem with uncertainty is that it brings the darkness of the future too close to the present, like during the polar night. It is especially dramatic if hyperinflation results, see **Figure 9**. *The Black Obelisk* (1956) by Erich Maria Remarque is the best depiction of hyperinflation I know, written long after the events of the 1920's.

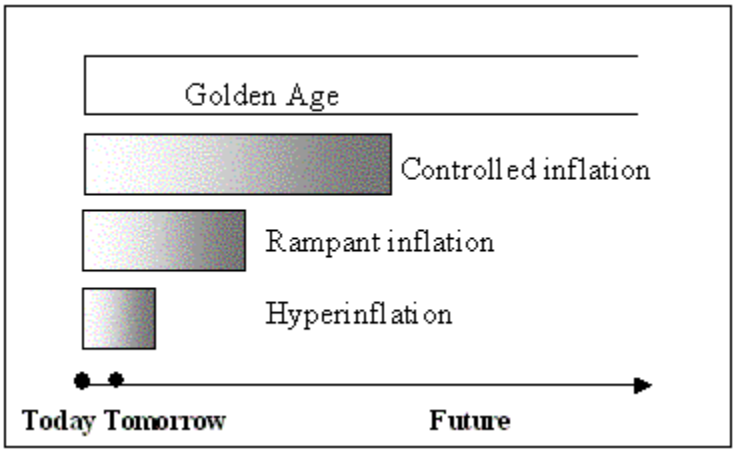


Figure 9. Uncertainty, inflation, and the future.

Another contribution to uncertainty comes from the growth of productivity, disposability of culture, mass entertainment, junk products, gadgets and appliances, often less functional but more and more baroque, etc. The cost goes, like all costs, to the consumer.

The wider the choice, the higher the uncertainty increment of a transaction: it is the "mustard choice" effect. Advertisement, therefore, has anti-mustard effect. Choice has a premium, part of which comes from competition. I cannot prove anything I am saying, but I am sure the economists and businessmen know all that. In modern economy, optimism is hot and profitable product. The future is bought and sold and, with enormous concentration of wealth, new financial instrument will be selling the future of the future

(second derivatives of calculus) pretty soon. Growth today is an instinct as powerful as sex and hunt for food.

The fever (where is the thermometer?) of supply economics burns holes in the wallets of consumers. The majority of them do not have money-making machines and credit is the only way to quench the thirst of acquisition. Credit, however, means chronic—and sometimes acute—uncertainty.

The Federal Reserve fights not inflation—Georg Simmel demonstrated that it should not matter for the standard of living—but credit. Tightening credit is not a means but the end in itself. It is a thermodynamic remedy and it literally prevents economy from overheating by decreasing the effective (abstract) temperature and associated with it chaos, i.e., uncertainty. Credit either spreads or clips the wings of the future.

Economists believe that inflation creates "inflation uncertainty," i.e., uncertainty about future inflation. I believe that the inherent uncertainty of economics, politics, and life in general creates inflation in an objective cause-effect manner. Thus, in terms of "mustard effect," should we not worry that the 61st kind of mustard will come from China with some poison?

Steady growth is a kind of certainty, by the standards of thermodynamically open systems. This explains the social acceptance of steady inflation. Anything steady, however, is temporary in exystems. This is why the WHEN question is central for neology.

> The question about post-1970 inflation should address not so much the current steady inflation as its absence before 1914. This is an exciting problem, but not for this Essay. In short, I believe that the Western civilization took a great evolutionary turn after WWI, which, actually, was the first stage of the Great Thirty Year War of 1914-1945. I would describe it as parting with Antiquity, its ideas, ideals, and heroes. It was a turn from the culture of elites to the mass culture. I read my first book in 1943, scores of them afterwards, and I still remember the spirit of the Western heritage based on the classics. There was an unbroken line from Plato and Aristotle to the beginning of the 20th century, but the subsequent events proved that both philosophers were wrong, outdated, or irrelevant on many key points. And so the culture, of which the stability of the price and choice were components, had to collapse together with its art, philosophy, and even logic.

Economics is certainly not my stuff. It is all open to analysis, mountains of numeric data await ambitious and underpaid physicists, but my mind is constructed differently. I am incapable of working with numbers. Mimicking the professionals, I can put out some more charts in **APPENDIX 1**, **Figures A1-4**, **A1-6**, and **A1-7**, but I am unable to comment on them. I believe that the image says it all. I think any possible combination of data has already been investigated by economists.

The question remains: why had we caught up the inflation in 1970, like some chronic disease, a kind of a slow and controllable prostate cancer?

My general guess is that the control over money by Federal Reserve consciously or subconsciously pursues the goal of control over the visibility of the future. It prevents the contraction of the range of predictability. It staves off the night. I have a feeling that this is pretty obvious to economists. But I am bothered by what lies behind the urgency of this control, at least under two last Fed Chairmen.

As always, a good question is half the answer, usually, more. It is the method, by the way, widely used by Mark Hammond in his *Heideggerian Investigation of Money*.

Here is my question and my answer.

> **What is predictability**?
>
> **Predictability is the ideal property of machine. It is the property of the clockwork. It is the ideal property of humans in totalitarian regimes and, more or less, corporate structures. It is what is expected of both machine, its operator, and the merchandise it makes.**

Speaking of …

WHAT IS THE DIFFERENCE BETWEEN US AND OUR MERCHANDISE?

Simmel writes about long series of exchanges that create the economic life. This is possible not only because buyers are also sellers, and sellers are buyers, but also because machine is merchandise and merchandise can be a machine, as **Figure 10** illustrates. In order to buy something you have to sell something. The answer to Figure 10 is: Yes, topologically, sellers, buyers, and merchandize are the nodes of the same network. Some sell their souls, others time, yet others hands, legs, tongs, or minds.

In such a web-like system, each node contributes its increment into stability. From the point of view of chemical thermodynamics (i.e., the principles of stability of structure), the speed of a transformation (the ***WHEN*** of the future) in a certain direction depends only on the height of the transition barrier. **This equalizes all components of the web in which nobody is free: neither the fly nor the spider.**

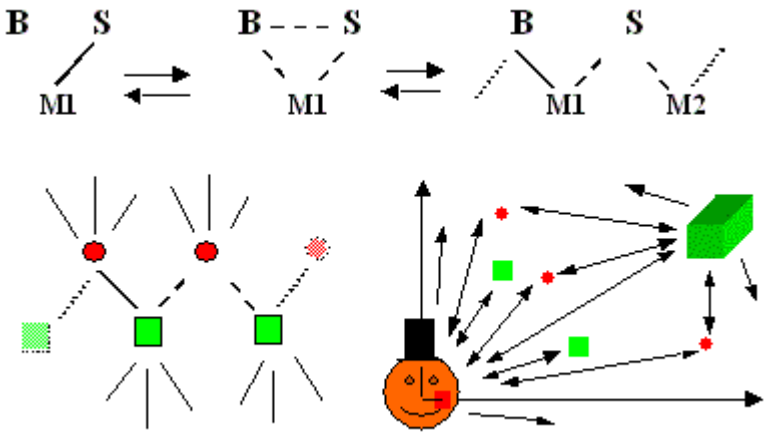


Figure 10 . Market network: buyers are sellers, sellers are buyers. Are they the merchandise of Things?

The Industrial Revolution is not the only ongoing great transformation of society. The other, less conspicuous revolution, in my opinion, started in a violent manner in 1914, against all expectations at the dawn of the century that was seen as the peak of the era of Man. I would call it the **abdication of Man** (the very word Man has become completely obsolete) from the crown bestowed on him/her by Enlightening. The spirit of that era could be found only in old books.

That Man has always been able to act like a beast is no news. But Man is showing more agility in being a Machine, rather, a *Manchine*, a word casually dropped by Mark Hammond. Indeed, a happy *Manchine*.

The outcome of this process is the biggest uncertainty I see in the future. I apply no good-bad value to it. I am just very curious.

ONE HUNDRED YEARS AMONG ALIENS

Although I do not know how original Georg Simmel was in his *The Philosophy of Money*, one thing is certain: he was brilliant and a century ago he left us the only one of its kind *The Pecuniary Comedy*. This gives us a point of reference to see the trend and, probably, project it for another century.

One of the central ideas of this Essay is that such projection is exactly what could not be done. The future is dark, especially one hundred years from now. Nevertheless, we can try to understand how the future works. The other central idea is that patterns evolve on a much slower scale that events and they can illuminate the future. Unfortunately, the more

abstract the pattern, the less relevant it is. If life is a walk on the edge of chaos (Christopher Langdon), yet we are alive, if history is a walk on the edge of despair, but we endure, then we can walk with patterns along the edge of reason.

The comparison of 2007 with 1907 would take too much space in this already obese Essay, but one thing is clear to me: slowly but steadily, for one hundred years, the society of men and women, whose natural biological and intellectual abilities are extended by technology, has been transforming into a fused and unified system (it can also be called society) in which Technos (man-made Things, machines, and systems) is a kind of super-kingdom in terms of Linnean classification. Humans make up Ethnos (you don't want me to say Humus, do you?). I like the term Ethnos because it points to variety.

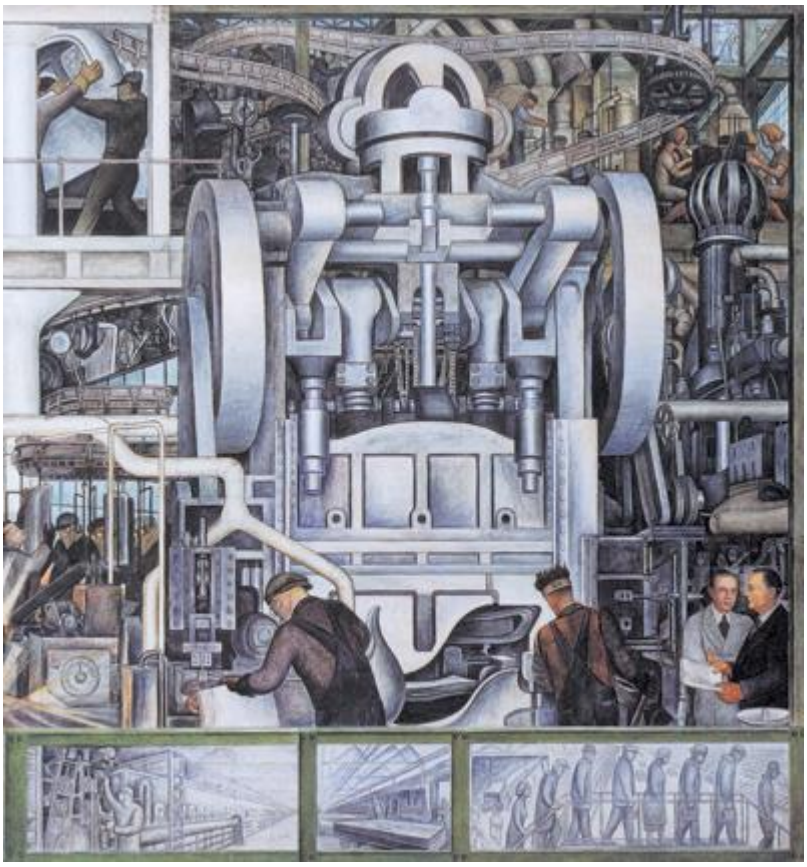


Figure 11. Diego Rivera: Detroit Industry or Man and Machine, South Wall, right fragment. Note the man in the bottom right corner with a kind of DNA code in hands.

Like the kingdoms of plants and animals, which run on the energy currency of ATP (adenosine triphosphate), Technos runs on money. Technos, roughly, consists of two kingdoms: IT (information technology) and MT (material technology). Humans as *homo sapience*, Ethnos, are the universal enzymes of this global system, see **Figures 11** and **12**, as well as the source of chaos which is necessary for any evolution. There is no kinetics—and no future—without some internal movement of a system.

Whether the two super-kingdoms are merging, diverging, or move toward symbiosis, and on what terms, will be seen in another hundred years, but money already seems to be the universal currency of life on earth. Everything, from giant sequoias to whales, from minerals to atmosphere, and from human life to the seat in the government has its price tag.

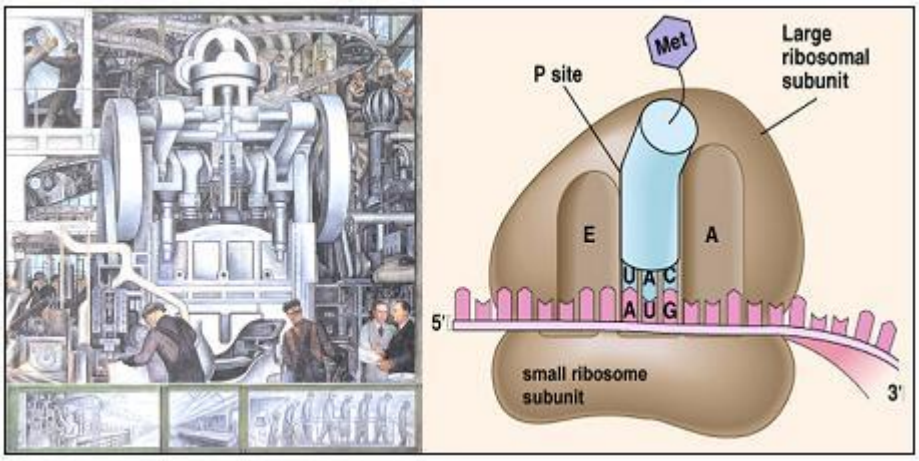


Figure 12. Diego Rivera's mural and ribosome, the main machine of the protein-making shop. The shop will not work without money, I mean ATP. It employs a staff of enzymes. (Source).

For at least one hundred years humans have been in a company of aliens—Technos—whom they frankensteinized in England in the last half of the 18th century, when machines began to make machines, like human had been making humans for ages. Humans and machines began to intermarry and breed because money turned out to be compatible with the physiologies of both.

Our children are their children. Their children are our children. Who is Cain, Who is Abel? Who is Esau? Who is Jacob? Sarah and Hagar? Ishmael and Isaac? I am speaking of long lasting patterns.

WHAT IS MONEY MAKING MACHINE?

Let's not overdramatize.

If our civilization becomes machinization and man becomes manchine, so be it. As a historical fatalist, I am reconciled with the future, as well as with the past. It is the present that I am able to decry for eight years in a row. But what is the money making machine from the point of view of a chemist?

As a word-making machine, I am already exhausted. Until the next Essay.

APPENDIX 1

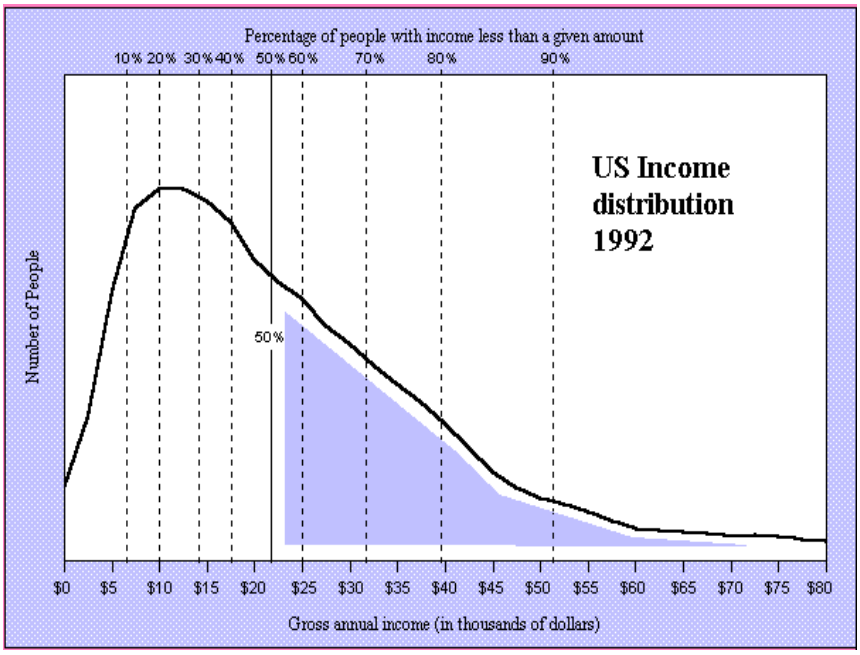


Figure A1-1. US income distribution, 1992. For an enhanced lifestyle people should exceed a certain income. The far right wing of the curve, not shown here, is, actually, a different social genus. Source .

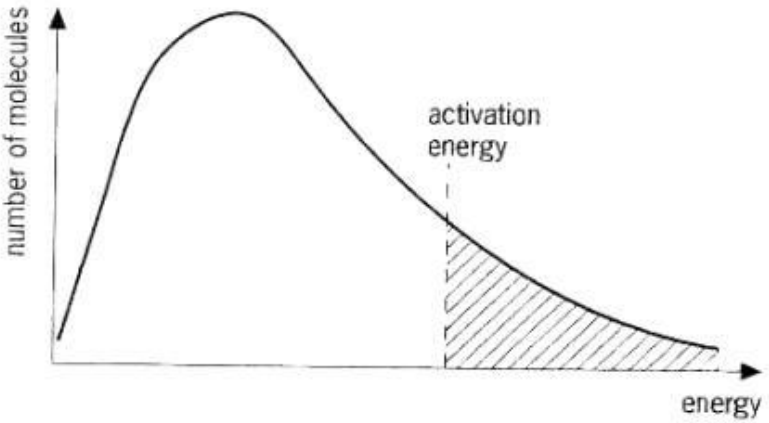


Figure A1-2. Maxwell-Boltzmann distribution of molecules of gas with energy between zero and, potentially, infinity. For a chemical reaction to occur, the energy of molecules should exceed the activation barrier.

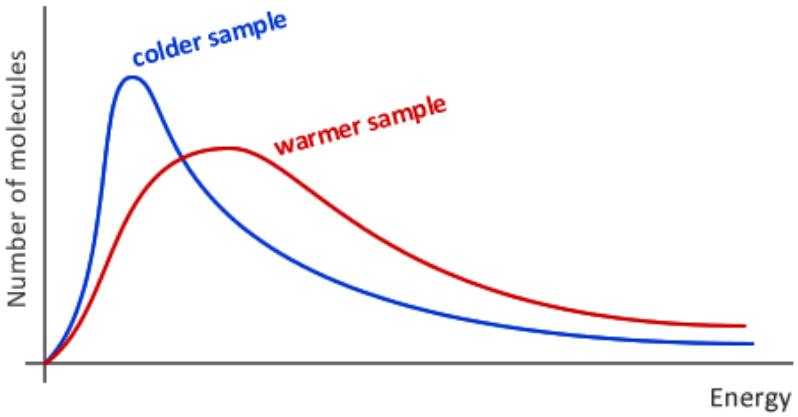


Figure A1-3. Molecular energy distribution at different temperatures.

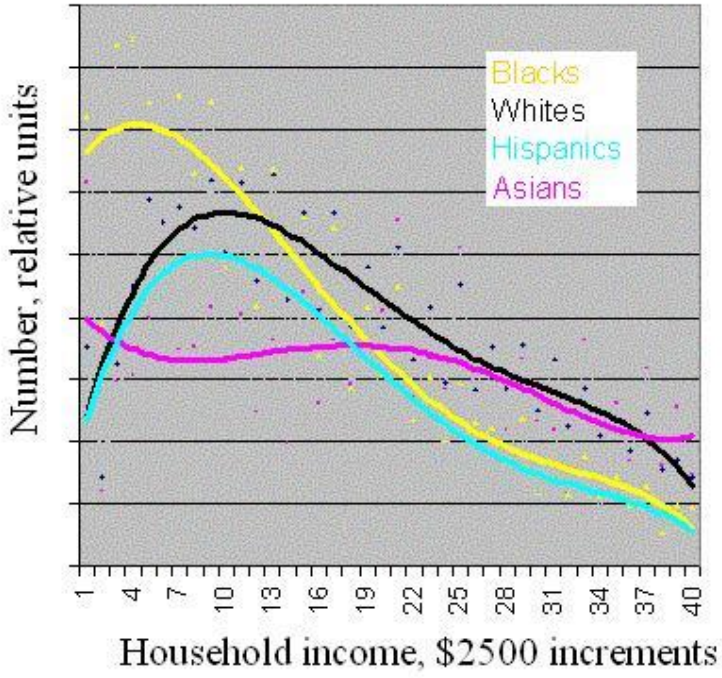


Figure A1-4. US household income distribution by race, 2004. Vertical scales for four plots are different

Anirban Chakraborti , a physicist and the author of *A physicist's attempt to model wealth distributions in economic models*, (an excellent introduction into econophysics) and other works, regards money as "agreement within a community to use something as a medium of exchange"

Marco Patriarca, who has joint publications with Anirban Chakraborti, compares money with energy in his *Simple models for the distribution of wealth* .

To be more accurate, **money is not energy**. A **quantity** of money transferred in a transaction or put to work can be compared with a quantity of Gibbs energy. This energy must be taken from somewhere.

Economy model	Gas model
x = money	K = kinetic energy
N-agent system	N-particle system
Trades	Interactions
$\lambda \rightarrow$ Effective dimension $D = 2\,(1 + 2\,\lambda) \,/\, (1 - \lambda)$	Space dimension D
Effective temperature $T = 2\,\langle x \rangle \,/\, D$ $\approx (1 - \lambda)\,\langle x \rangle$	Temperature $k_B T = 2\,\langle K \rangle \,/\, D$
$\xi = x \,/\, T$	$\xi = K \,/\, T$
$f(\xi) = \gamma_{D/2}(\xi) = \frac{1}{\Gamma(D/2)}\,\xi^{D/2-1} e^{-\xi}$	

Figure A1-5. Table of comparison between humans and molecules.

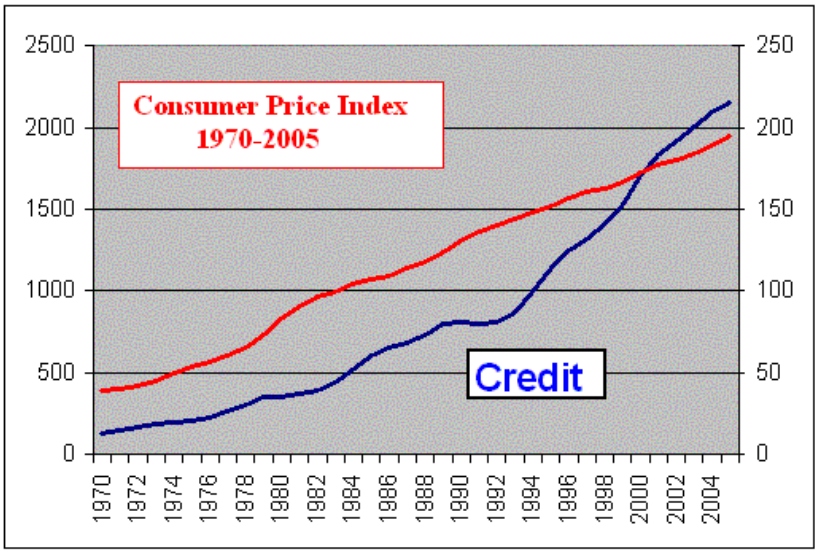
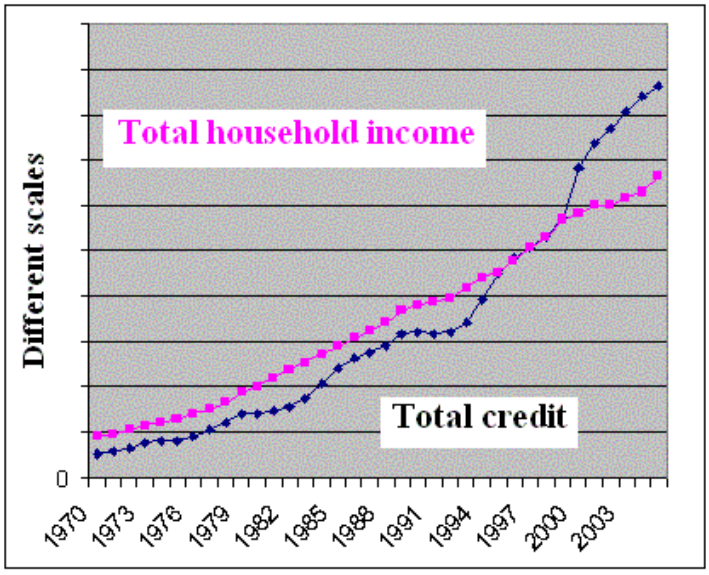


Figure A1-6. Credit and inflation.



It looks like inflation follows credit. Does credit anticipate uncertainty or causes it?

Figure A1-7. Credit and income

APPENDIX 2

A. The structure of money

PRICE STRUCTURE OF PETROLEUM PRODUCTS IN BANGKOK
8 JUNE 2005
UNIT:BAHT/LITRE

	EX-REFIN. (AVG.)	TAX* B./LITRE	M. TAX*** B./LITRE	OIL FUND (1)	OIL FUND (2)	CONSV. FUND	WHOLE-SALE PRICE (WS)	VAT	WS&VAT	MARKETING MARGIN	VAT	RETAIL PRICE
ULG 95R.; UNL	15.1404	3.6850	0.3685	1.2000	0.0000	0.0400	20.4339	1.4304	**21.8643**	0.6315	0.0442	**22.54**
ULG 91R.; UNL	14.6508	3.6850	0.3685	1.0000	0.0000	0.0400	19.7443	1.3821	**21.1264**	0.5735	0.0401	**21.74**
GASOHOL	15.1161	3.3165	0.3317	0.0400	0.0000	0.0360	18.8402	1.3188	**20.1590**	0.8234	0.0576	**21.04**
KEROSENE	15.5270	3.0550	0.3055	0.1000	0.0000	0.0400	19.0275	1.3319	**20.3594**	2.5239	0.1767	**23.06**
H-DIESEL(0.035%S)	17.3254	1.3050	0.1305	0.5000	-1.7600	0.0400	17.5409	1.2279	**18.7688**	-0.0736	-0.0052	**18.69**
L-DIESEL	16.9405	1.4050	0.1405	0.5000	-1.9600	0.0400	17.0660	1.1946	**18.2606**	0.2050	0.0144	**18.48**
FUEL600 (1) 2%S	9.2207	0.5652	0.0565	0.0600	-	0.0400	9.9424	0.6960	**10.6384**	3.5249	0.2467	**14.41**
FUEL1500 (2) 2%S	8.1727	0.5246	0.0525	0.0600	-	0.0400	8.8498	0.6195	**9.4693**	4.0567	0.2840	**13.81**
LPG-SMALL(B/KG.)	12.6768	2.1700	0.2170	-2.6069	-	0.0000	12.4569	0.8720	**13.3289**	3.2566	0.2280	**16.81**
LPG-LARGE(B/KG.)	12.6768	2.1700	0.2170	-2.6069	-	0.0000	12.4569	0.8720	**13.3289**	3.2566	0.2280	**16.81**
PG-CARS(B/KG.)	12.6768	2.1700	0.2170	-2.6069	-	0.0000	12.4569	0.8720	**13.3289**	3.2566	0.2280	**16.81**

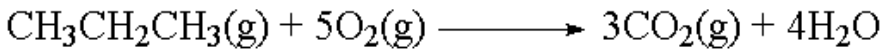
Figure A2-1. Structure of price. (Source). Note the second and third lines from the bottom. They relate to LPG, Liquified Petroleum Gas, usually, propane and butane. The retail price is a sum of increments.

B. Structure of energy

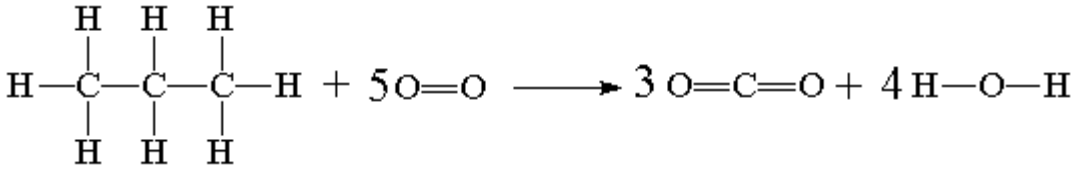
Quotet from: Bond enthalpy and mean bond enthalpy.

An example.

The complete combustion of propane can be represented by the following equation:



or we could redraw it to represent the bonds present:



We now need to work out how many of each bond type we have broken.

- 8xC-H
- 2xC-C
- 5xO=O

And then how many bonds have been formed!

- 6xC=O
- 8xH-O

So using data tables we can look up then average bond enthalpies from, and calculate the enthalpy change of the reaction.

Bond Type	Average bond enthalpy /kJ mol^{-1}
C-H	+413
C-C	+347
O=O	+498
C=O	+805
H-O	+464

Notice that they are all endothermic.

So we can now do the sum, remember, sum of bonds broken - sum of bonds formed.

$\Delta H_r° = [(8x413)+(2x347)+(5x498)] - [(6x805)+(8x464)]$ $= -2054 \text{ kJ mol}^{-1}$

- 8xC-H
- 2xC-C
- 5xO=O

And then how many bonds have been formed!

- 6xC=O
- 8xH-O

End of quotation

COMMENTS:

In **Figure A2-2** I present the "structure of energy" generated by burning a mole (44g) of propane in a way similar to the price structure of fuel in Bangkok.

Fuel	**+ 8 x C—H**	**+ 2 x C—C**	**+ 5 x O==O**	**- 6 x C==O**	**- 8 x H—O**	**Energy output**
LPG (propane)	3304	694	2490	-4830	-3712	- 2054 kJ/mol (minus means out of the furnace)

Figure A2-2. Structure of energy

APPENDIX 3

SOCIAL AND CHEMICAL STRUCTURE

The following figure illustrates the concept of social network. (Source).

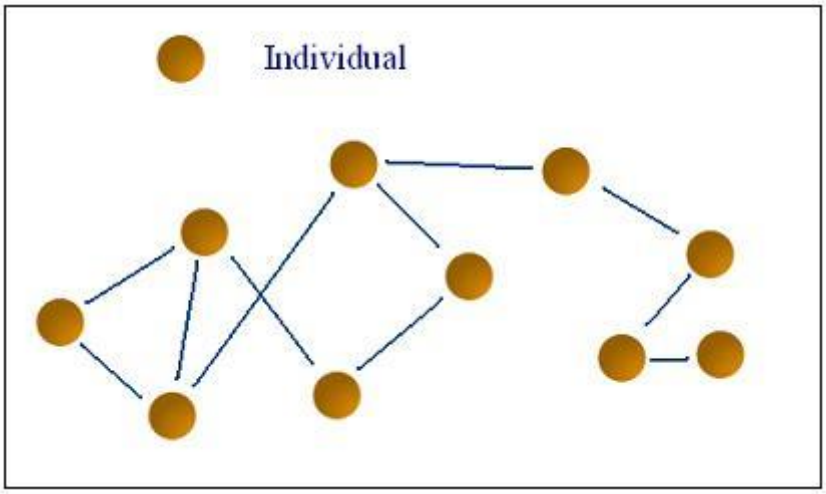


Figure A3-1. Social network

In the above figure, all individuals and bonds between them are identical. Georg Simmel's idea was: "Society is a structure of unlike elements." In chemical structures both atoms and bonds can be different. The individualized "chemical" version of social network is presented in the following figure:

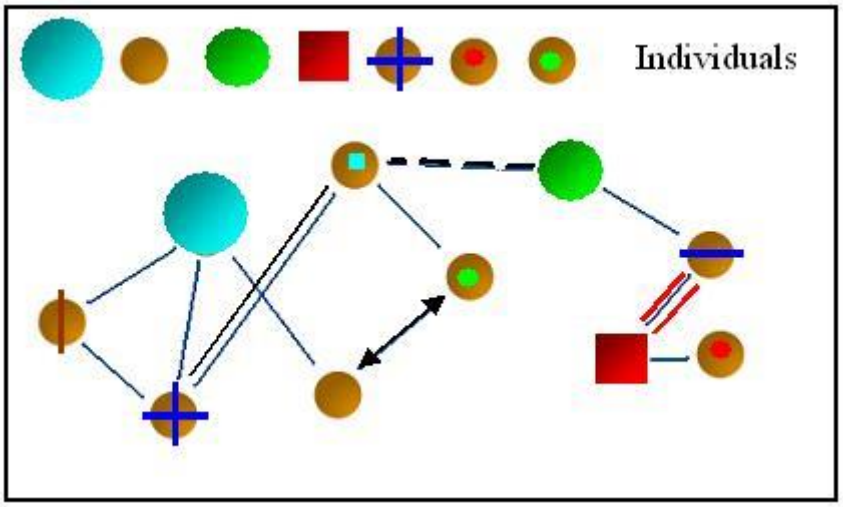


Figure A3-2. Social network of unique individuals.

There is a variety of social bonds, among them domination, cooperation, rivalry, etc.

Social bond can be not only attraction, but also repulsion, denoted as <———>.
The triple bond might mean an intimate connection. See *History as Points and Lines*.

The bond types are limited, while individuals are countless. Science always generalizes. The following figure makes distinction between **types of individuals** or their roles:

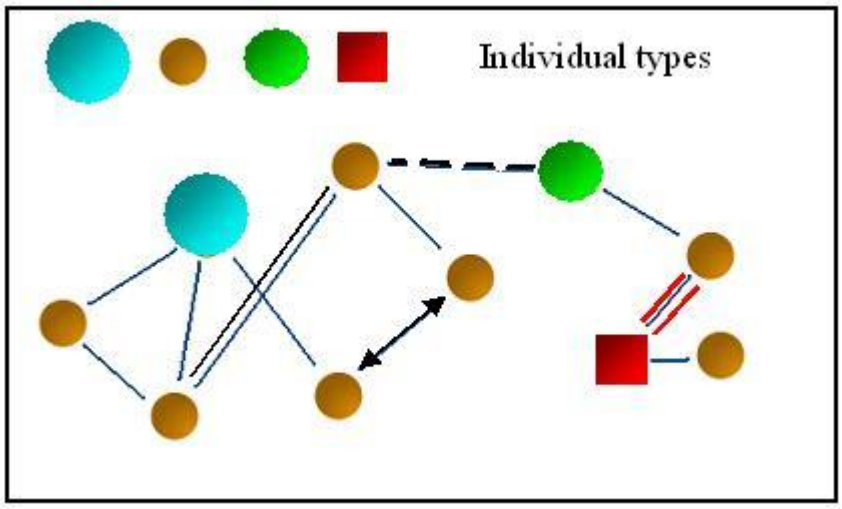


Figure A3-3. Social network of types, chemistry-style.

APPENDIX 4

David Hume on money:



Money is not, properly speaking, one of the subjects of commerce; but only the instrument which men have agreed upon to facilitate the exchange of one commodity for another. It is none of the wheels of trade: It is the oil which renders the motion of the wheels more smooth and easy.

(David Hume, *Of Money*)

2007

ESSAY 56. OUT OF ONE, MANY



The richest 2% of adults in the world own more than half of global household wealth according to a path-breaking study released today by the Helsinki-based World Institute for Development Economics Research of the United Nations University (UNU-WIDER). The most comprehensive study of personal wealth ever undertaken also reports that the richest 1% of adults alone owned 40% of global assets in the year 2000, and that the richest 10% of adults accounted for 85% of the world total. In contrast, the bottom half of the world adult population owned barely 1% of global wealth. (Source)

In the USA, in 2000, top 1% owned between 36 and 38% of wealth (from full report). In purchasing power parity terms (PPP), the Gini coefficient of inequality was 0.80, the same as in the entire world.

NOTE (2016): About 25 years ago, I, a contemporary of Hitler and Stalin, had first run into the statistics of inequality in the US. Since then, I have been troubled by the trend that promised social stress, loss of freedom, and rise of extremist leaders. The fundamental laws of nature, as well as the entire human history, clearly indicated that inequality of distribution of any intensive parameter (temperature and concentration, wealth and population density, progressive and conservative ideas) meant instability. In human history, instability manifested in wars, revolutions, and large scale movements of people. In 2016, two extremists and demagogues from opposite sides, Donald Trump and Bernie Sanders, not even promoted by their parties, are among leading candidates of the presidential primaries, inequality is among hottest topics, Russia is an aggressive dictatorship, and huge human waves from Africa and Asia are crushing onto the European coasts. I have edited this Essay only stylistically.



MOLECULES AND PEOPLE

This Essay adds another related topic to the three preceding Essays about power (**Essay 53**), growth (**Essay 54**), and money (**Essay 55**): inequality. Wealth distributes over the population from zero to indefinitely high values in the same way as energy of molecules in chemistry.

Illustrations of the peculiar similarity between molecules and people, well recognized by econophysics, were presented in **Appendix 1** to **Essay 55**, **The Chemistry of Money**. I repeat in **Figure 1** only two plots.

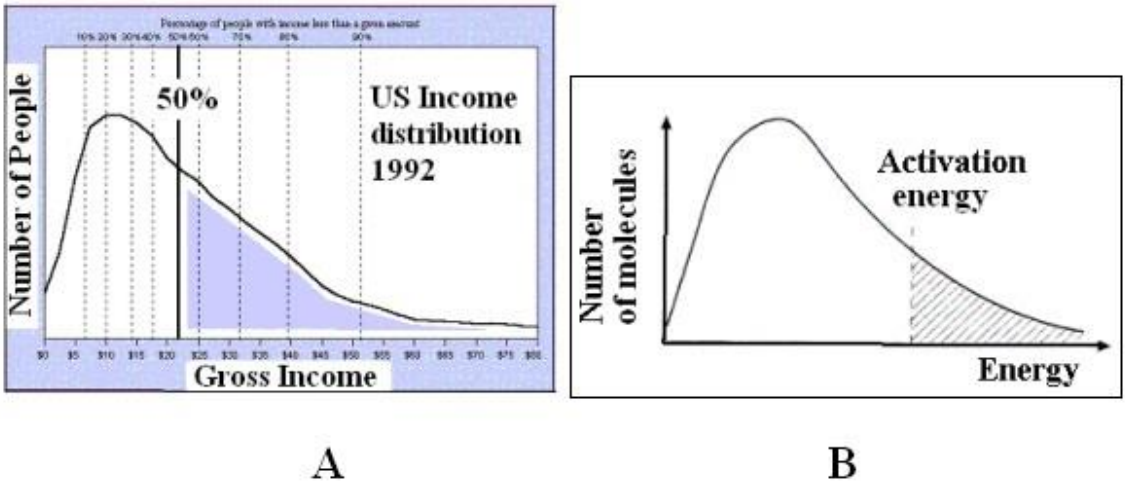


Figure 1. People (A) and molecules (B): similarity incarnated.

In the physical picture of the world, unequal distribution of a system parameter over space usually creates forces and flows that move the system toward a new state. This happens when the system possesses a sufficient degree of internal chaotic motion, which can be called in common language mixing or fluidity, and, in the language of abstract systems, fluctuations and **temperature**.

When we talk about most fundamental properties of the world, a lot of subtleties unexpectedly arise. Simplification is unavoidable. The most fundamental properties do not have even more fundamental properties to be used for explanation. Physics simply accepts them, as long as the foundation does not buckle, and then simply moves to a new and better foundation.

Two states of a cylinder with gas and a piston in **Figure 2, A** and **B,** have the same number of gas molecules, but in **Figure 2B** the inequality of pressure creates a force that returns the piston into its central position **C**, same as A.

It appears that the principles, not to say laws, are exactly opposite in the socio-economic picture. In those stable societies that have the starting position as in **Figure 2D**, any attempt to establish equality by moving the piston to position **E** creates a force that restores the inequality. The final state of historical evolution, however, is not the initial **D**, but rather something like **F**, which is a curious combination of equality and inequality: equal rights and unequal results.

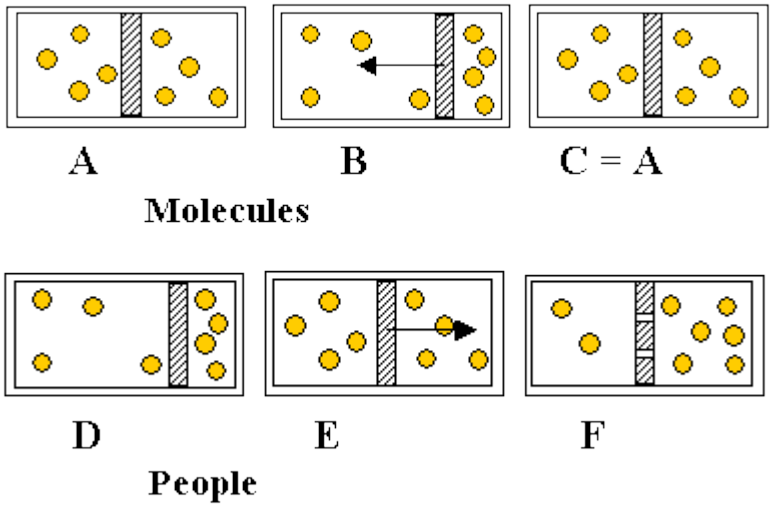


Figure 2. Molecules (A to C) and people (D to F): difference incarnate.

Society does not know anything like physical equilibrium, but only a steady state maintained by consumption and dissipation of energy. The type **F** equality of the market means a somewhat (not much) porous structure of the partitions between social strata. This equality of buyers and sellers, however, for some reason results in a great and growing inequality. What is that reason? To say, with Georg Simmel, that small money and big money are qualitatively different is not enough. There must be some mechanism behind the famous verse of Matthew :

> For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath (Matthew, 25:29).

I am curious not about the inequality itself, all the more, not about its moral interpretations, but about the forces that tend to restore it. The best illustration that I know is the collapse of the Russian brand of socialism built on egalitarian ideas. It managed to last for 70 years because of the extremely low social temperature, never exactly egalitarian, however,

If the ramifications of **Figure 2** be trusted, this alone should warn against a too close parallel between people and molecules and raise doubts about the mainstream of econophysics. But physics has always had powerful instincts of self-correction which it bestows on science in general, and we may expect substantial progress. The problem with econophysics, however, is that it is fully accessible only to a narrow circle of professionals: the partition between them and the rest of us is not porous. Other problems were touched upon in **Essay 55**.

Physics looks to me like handling simple things by complex means. Chemistry, on the contrary, deals with complex things by simple means. The difference between the two is the matter of convention: there is only one science. The much simpler approach of chemistry to complexity through simplicity can potentially contribute to **understanding** the world of the twenty-first century, without many equations, but with funny pictures instead.

I want to look at the idea of inequality and phenomena behind it from the chemical—not economic, political, or even physical—point of view. I am looking for simplicity.

Chemical reactions can run and chemists can do their job only because of the natural inequality of otherwise identical molecules. Energy is a kind of "wealth" in the world of molecules, as wealth is a kind of energy in the world of people. The energy of molecules in fluids is distributed as unequally as human wealth and only a small part of molecules are "wealthy" enough (i.e., exceed the activation energy, **Figure 1B**) to engage into chemical transformations. Moreover, different types of possible reaction products grow with dramatically different speed. Chemistry is driven by elites, quite close to how Vilfredo Pareto saw society.

Life is based on all sorts of inequality of molecules, cells, tissues, and organisms, while equality comes with death.

The distribution of molecules by energy, **Figure 1B**, follows from the multiple exchanges between numerous "particles." Thus, we can imagine a rare coincidence of collisions between molecules that results in an especially high energy of some of them. This is how a molecule can be accelerated well above the average.

The big difference is that the human particles retain and multiply their monetary "energy," while individual molecules lose energy as easy as they gain it. The phenomenon of individuality exemplifies the radical difference between people and molecules, often overlooked. The usual yearly statistical tables of income and wealth do not contain names and they are completely silent on the subject whether the wealthy and the poor **families** are the same as the previous year. They all advance or retreat, but on average rather slowly.

The half-serious explanation of wealth inequality, therefore, is that the inequality exists because it existed a year ago **on personal basis**. The billiard balls of real life are of different size and shape and they even have unique ball-prints. This indicates that the

ability of wealth to grow has something to do with the design of the individual owner. An idea like this is very chemical. For a chemist the world consists of **individual** chemical structures, even though they are classifiable into **types**. For a physicist, the molecular world, as well as the markets, consists of large crowds of clones of a few basic types.



DISEQUALITY

However natural inequality is for a chemist, I am instinctively troubled by human inequality. But what are its dangers? Instability, of course, but not so much the instability of the transition state as the familiar specter of the **fight** for equality.

The perception of equality as justice and inequality as injustice has a history as long as the entire intellectual history of humanity, but, probably, somewhat shorter than its opposite: inequality as justice.

In 1917 Russia had started a large scale equality experiment on the one sixth of the entire global landmass, but seventy years later the self-contradictory empire of equality collapsed and embraced a sharp inequality as justice. The same has been happening with the Communist China. The word **communism**, i.e., the doctrine of economic equality, became synonymous with Medieval heresy in the Joseph McCarthy years. Nevertheless, more intellectuals, i.e., people in possession of extraordinary wealth of intellect, begin to feel the striking inequality of the twenty-first century America as a kind of a growing tumor.

My own experience with Communism leaves no doubt that, regardless of whether equality is good or bad, it is impossible.

Figure 3 presents two images of inequality, in which **Figure 3A** was the popular propaganda tool of the proponents of equality in early twentieth century. In the Russian version of the pyramid the czar was on the top.

The pyramid represents the idea of society as a mechanical system in which the weight of power pushes in the single direction (**3B**) and compresses an invisible spring which is supposed to unwind as revolution. In the czarist Russia, the internal pressure was released in a sequence of revolutions. In the Communist Russia, the pressure of power resulted in the massive loss of interest in work, drop of productivity, steady decline, and, finally, the senility of the aggressive war in Afghanistan. Indeed, what is the historically traditional way to assert power? War, of course, in its many forms.

The modern criticism of wealth concentration (for example, by Gretchen Morgenson under the *ad hominem* title *Hedge Funds and the Little People*) points to the new for America pattern of using the power of money for making more money instead of investing in material or educational progress, as the robber barons of the past did. I am afraid that the consequences of this evolutionary novelty cannot be fully comprehended at this point. I interpret the phenomenon exemplified by hedge funds and private equity as the takeover of the energy function of money by its information function, see **Essay 55** on both. My purely intuitive expectation associates with the word bubble. Concentration of energy without dissipation is explosive. This, by the way, is the thermodynamics of suicide bombers in seven words.

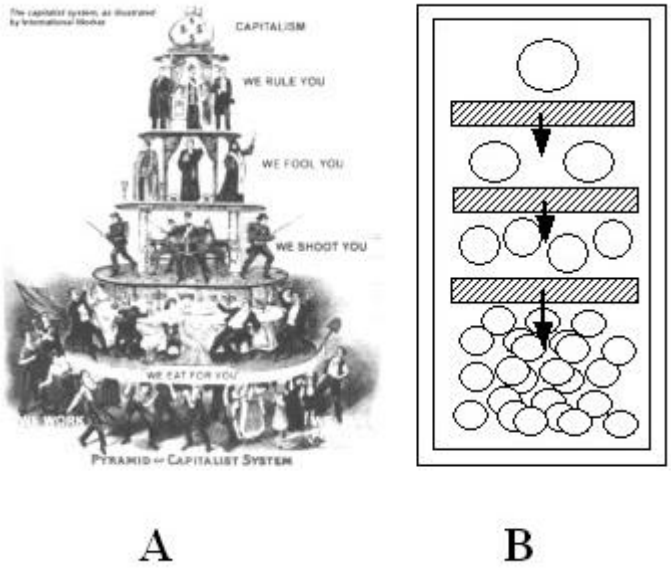


Figure 3. Apotheosis of inequality.

There could be other explanations of the obese infertility of wealth. Georg Simmel noted that money makes sense only in exchange. Like the value of the new car after purchase, the wealth immediately drops if large chunks of it are dumped on the market for realization and the price falls. In this sense, huge wealth is a social tumor and an attraction for quack surgeons, as well as observers like myself.

If the type **D** inequality (**Figures 2D** and **3**) looks like slavery, the type **F** inequality, which follows from equal opportunities, is socially acceptable, at least for now. The taxation seems to squeeze the wealthy more than the poor, although this is also illusory. It looks like even most common words split their meaning in two when applied to rich and poor. I would call it **disequality**, a kind of social schizophrenia around inequality. One can only wonder where the social evolution leads us and whether the authoritarian pyramidal structure will be back somewhere along the way, called, of course, perfect democracy.

The word **revolution** has recently boomed loud as Republican and Islamic Revolutions, both in the name of the higher authority. It is said that historic tragedies repeat as farce, but none of the two recent revolutions looks like farce to me, especially with the prospects of shrinking global resources of all kinds, including, for the first time, the inhabitable land. The next American war will certainly bring to power a Napoleonic president running under the slogan **Power or Defeat**.

I am wholeheartedly for powerful America armed with all kinds of weaponry, but in this Essay I am intrigued not by the power of nukes, lasers, and bullets. It is the humble, invisible, and omnipotent power which, humming day and night, keeps the rich and the poor apart, as electrodes under voltage, following the Gospel's dictum. I am far from judging it because we owe our entire civilization and the best of its culture to inequality, for better or worse, and because I do not see any alternative. We are competitive creatures.

All balls roll down on the inclined plane, but a mysterious power pushes some of humans up, knocking some others down. That the intellectual elite does not coincide with the wealth elite, let alone with the power elite, tells me that the inequality has something to do with the fundamental laws of nature and not just with the personal abilities.



INEQUALITY MACHINES

The pump in **Figure 4** maintains a big difference in the levels of the two connected water tanks. Taking energy from the power line, it pumps water left to right until the pressure it creates equals the back pressure of the water on the right. If the pump without a back valve stops, the water in both tanks will level out. This unpretentious picture is, in my eyes, the ideogram of life, economy, culture, science, technology, society, mind, politics, and all other evolving complex systems. Ideogram is a simple mundane image representing a very abstract pattern.

I believe that some socio-economic device works like a pump and maintains the unequal distribution of wealth. I believe that this device employs the same pattern not only as the pump, but also as the power station in the background. I would call the pattern the **inequality pump** because it consumes energy and uses it for maintaining the inequality that without it would collapse and reverse to equality. Equalization, better known as equilibrium, happens in typical physical and chemical systems, but not in evolving complex systems (**X-systems**, better pronounced as "exystems"), at least not for long periods of time. Economy is such an "exystem."

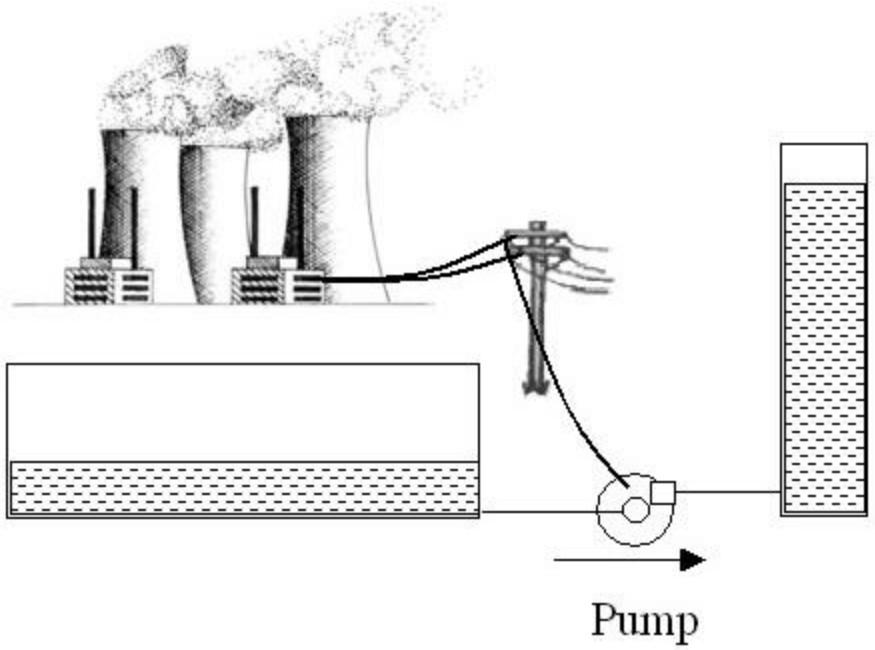


Figure 4. Inequality pump and its power supply.

There is no such pump in the world of colliding molecules (Maxwell's demon came close) because they are in a constant exchange of energy through collisions. Each marked molecule passes the whole range of values. It does not discriminate between gain and loss. Not so for individuals in society for whom gain is good and loss is bad. The institution of private property is not yet invented for molecules, although we could think about molecules that accumulate energy in personalized manner. Genes are molecules and they do it in a very peculiar way.

The following two examples will illustrate the concept of inequality pump.

EXAMPLE 1. HEAT ENGINE

The heat engine consumes the chaotic thermal energy that cannot be used for any work unless converted in an appropriate form, such as electricity, mechanical displacement against a force, high energy chemical bonds, light, sound, and not too many other forms. This kind of energy is called in physics and chemistry **free energy**, i.e., available for performing work. This term **free energy**, as well as its surrogate **useful energy,** sounds extremely misleading outside physics and chemistry and I will avoid it. Officially, it can now be called only as **Gibbs free energy** or, better, **Gibbs energy**.

I believe it is better to call a spade a spade and refer to thermal energy as **heat**, while by energy I will mean energy in general, including what is available for work. This is not satisfactory either, but less awkward than "free" energy.

Regarding economics, I suspect that the term free energy, which had spread after around 1920, was a reflection of a **relative** indifference of scientists to matters of economy and, however hard to believe, personal finance.

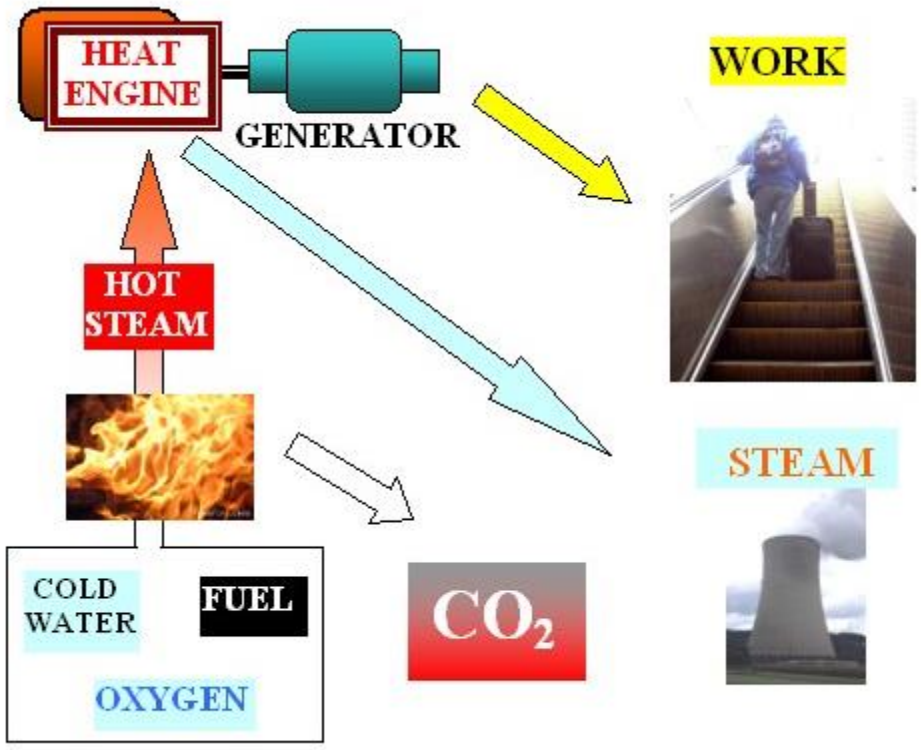


Figure 5. Work from heat. Heat is chaotic movement of particles. The escalator moves in one direction against the force of gravity.

Figure 5 presents the qualitative balance sheet of heat engine. The power station consumes fuel, water, and oxygen from air. It burns the fuel, boils water, ejects carbon dioxide (CO_2), and directs the hot high pressure steam into the engine. The steam expands in the heat engine, the engine extracts the mechanical energy that can perform work, and the generator converts it into electricity, which is used for driving the loaded escalator against the force of gravity.

The engine **splits the flow of energy** into (1) the residual **heat,** irreversibly lost to atmosphere with low pressure steam and (2) mechanical energy.

Heat engines can be designed in many very different ways, such as, for example, turbine and various internal combustion engines. In terms of abstract patterns, the design will not tell us anything unless we look at it closer before stepping far back.

The heat engine that launched the Industrial Revolution consists of a cylinder and a piston, **Figure 6A**. In most general terms, this simple contraption imposes a stern **constraint on the chaotic behavior** of the molecules of steam: they can expand in only **one** of indefinite number of possible directions: out of many, one. The forceful displacement of the piston in a preferred direction can perform work. The useful energy can be diverted and separated from the remaining chaos of the lower pressure steam which has to be ejected. In this way chaos is partially converted into order. The productive social order of America would be impossible without OUT OF MANY, ONE. Of course, the excess of steam should be let out and freedom of expression serves as the safety valve.

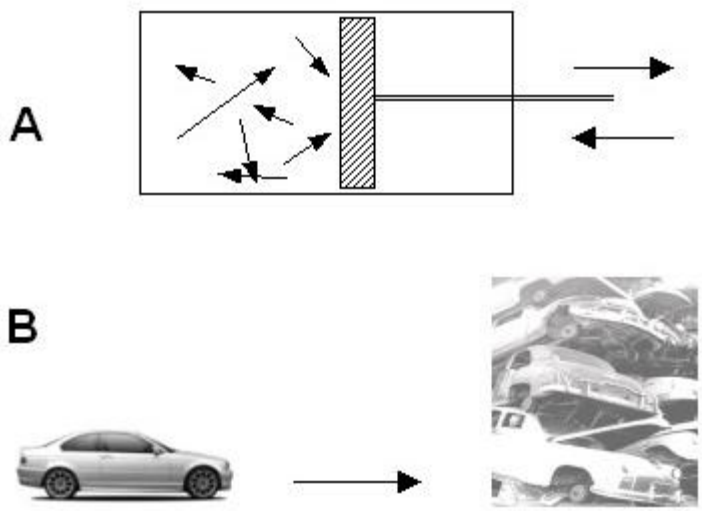


Figure 6. Chaos into order (A) and order into chaos (B).

The opposite process is illustrated in **Figure 6B**. This picture shows that the high order of the running automobile ends up in the partial chaos of the junk yard, the symbol of the final output of economy.

But what happens with all that energy produced by power stations? What is not used for economic activity, for example, the connection of various parts into more ordered assemblies, turns into heat: the organized energy is dissipated like the energy of the ejected steam of the heat engine. The beautiful assemblies of parts made of metals, plastics, ceramics, and many other expensive man-made things fall apart, rust, burn, or fuse together, returning to chaos.

The same sad thing happens to living organisms. Economy, meanwhile, flourishes. So does life.

> **NOTE**. In *The Rusty Bolts of Complexity: Ideograms For Evolving Complex Systems* I described (not claiming originality) a brushmobile, a simple mechanical device that transforms shaking into climbing up the inclined plane. It employs the same pattern principle as the steam engine and clockwork. **NOTE** (2016). In order to turn chaos into work, we need a system that has a limited degree of freedom, i.e., order or organization. American political system is another example. Has it been so successful over years because, like a piston in the cylinder, it had only two extreme states? Probably, so. But it can be very fragile in the presence of global authoritarian rivals. Elections of 2016 look like the first crack.

EXAMPLE 2. LIFE

Without going into details of the biochemical design of life, which is much more complicated that any engine, but uses the same principle—it is cyclical, but spinning in one direction—let us look at the most general properties of living cells.

Production of work from heat is not a natural phenomenon, the reverse process is. Somebody has to invent and make the device that constraints chaos. The process can be compared with taming the wild horse and making it move in the direction desired by man, usually, along a road track and not as the horse wants. Some kind of equipment and training time is needed for that. The horse, however, performs work not by its body heat, but by **splitting** its energy into the part that goes to the horse and keeps it alive and well, and the part that is used by the man who feeds it. The energy is supplied by an internal power station, which does not use steam, but still burns fuel.

The living organism splits energy like the heat engine. The difference is that the consumed energy is not heat and large part of it goes for maintaining a precarious existence of the living organism pushed by the laws of physics to give up life and return to dead matter. The rest of energy is lost to the environment.

The domesticated horse spends part of energy for performing work for the master. I believe that was the core idea of Karl Marx regarding *der Mehrwert* , surplus value. By using the horse rather than man I try to overcome my allergy to Marxism that I developed during my Soviet schooling.

However grudgingly, I must acknowledge that Marx was prophetic on many points. The exchange of national identity and sovereignty for money was one of them.

The horse feeds on the chemical energy in the fodder and uses it not only for maintaining the body temperature and performing physical work, but also for many intricate biochemical and biophysical purposes that life implies. In this regard, the difference between horses, cows, us, and our economy is not so big—if we step back far enough.

Figure 7 presents the workings of the cow in the same manner as **Figure 5** does for heat engine. If it looks like the cow is an engine of internal combustion, so it is. The cow even exhales (surprise!) carbon dioxide, like our cars and, by the way, we ourselves.

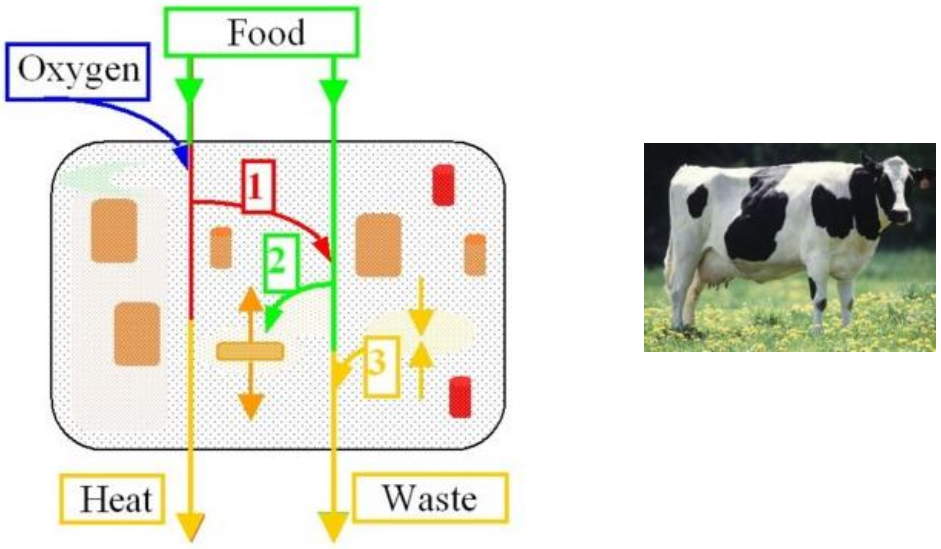


Figure 7. The qualitative balance sheet of cow

In **Figure 7**, **pathway 1** (red) supplies energy in the form of ATP (adenosine triphosphate), **pathway 2** (green) assembles atoms of nutrients into tissues of the cow (similarly to the assembly of automobiles, see **Essay 55**), and **pathway 3** (yellow) ejects the extra atoms to the junkyard, where the remnants of the cow, too, will find its final place. Unlike cars, cows reproduce themselves, as if a car that grows another car within itself from its washer fluid reservoir.

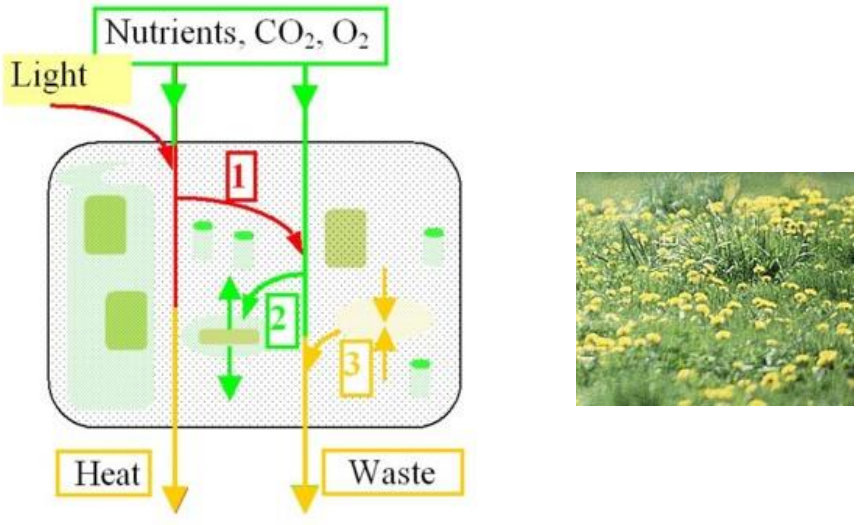


Figure 8. The qualitative balance sheet of grass

Figure 8 presents in the same manner the fresh grass that the cow eats. By waste I mean the rejected dead parts of the organism, the counterparts of our car tires, but probably edible for other organisms.

One important component of the balance is omitted in **Figures 7** and **8**. Which one? We will come to it soon.



ECONOMY AND CHEMISTRY

The relation between life and chemistry is obvious: life is a complex network of chemical reactions.

In order to discover the deep kinship of economy with chemistry, which was a small revelation for myself, as well as with life, we need to notice the elephant in the Great Hall of Economics. Here it is:

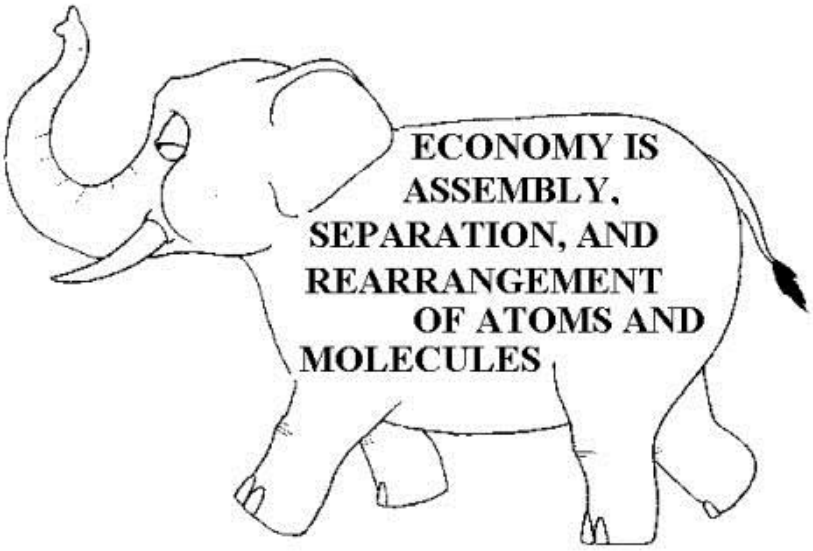


Figure 9. The elephant of econochemistry. No, it is not white, but just invisible to non-chemists.

The elephant of econochemistry is a configuration of pattern chemistry, i.e., it belongs to a more abstract category of systems. Here is another species: to obtain the elephant of politics, substitute politics for economy and people for atoms and molecules. What that elephant eats is a question for your homework.

Economy is assembly, separation, and rearrangement of atoms and molecules. So is chemistry. This automatically legitimizes a chemist's authority (together with a physicist's one) in the matters of economics. Growing corn, making computers, cutting hair, printing money, punching keys, pushing buttons, sewing buttons onto shirts, making buttons, even thinking about buttons—all that includes displacement of atoms and molecules, never happens on its own, requires energy, ends up in dissipation and destruction, and is up for sale or barter.

Economy is an econochemical system in the same sense living organism is a biochemical system. It is in a constant process of change by creating, breaking up, and rearranging bonds between some numerous atomic entities, original atoms and molecules among them, but also bricks, bolts, nuts, walls, gears, humans, companies, ideas, and so on. Note, however, that atoms are perfectly preserved in this turnover of matter, unless in nuclear industry.

Of course, chemistry proper would be too much of a white elephant (or red herring?) for economics. But the chemical way of thinking is not. For in-depth understanding of this very abstract approach, see works on **Pattern Theory** by Ulf Grenander and his expanding school of thought.

Which leads us to the next ~~tusk~~ task: there must be a powerful source of chaos, as well as a powerful constraint in the very design of the engine—better to say living body—of economy.

Having just claimed the chemist's birthright to speak about economy, I must step back into the shadows. I am not the right chemist. My observations of American and world economy are too short and superficial and I did not think enough about it. Most importantly, I have no economic education and even much understanding of the subject. I can only try to draw attention to it. But wait, oh yes, my daughter and son-in-law subscribed me to **The Economist** a year ago. I am already in the second year. And so I am stepping out of the shadows again.



THE CASH ELEPHANT (???)

My point is that the waste, dissipation, destruction, loss, wear, junkyard, dump, and yard sale are as essential for understanding economy as creation, design, inception, production, investment, gain, profit, triumph, etc.

If we take all that into account, the thermodynamic balance sheet of economy looks the same as the balance of power station or cow. Matter includes fuel and raw materials. Some organs of the econo-elephant are made of fertile land, some of humans. See **Figure 10**.

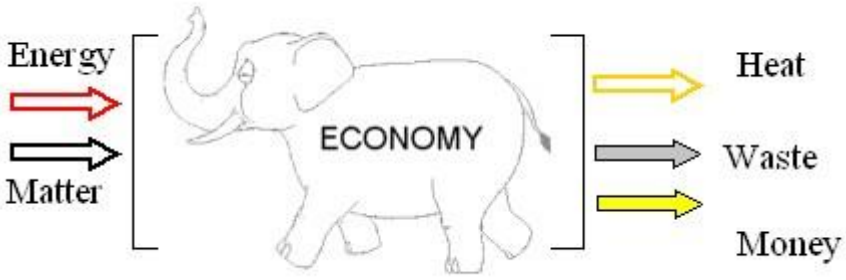


Figure 10. Something is wrong with this cash elephant.

To follow this direction of thought, gold is the only kind of waste that is as good as money.

No, something is wrong with **Figure 10**. Where is information and knowledge? As I see it, humans are part of economy, like horses were (and still are). So is knowledge in their—human and equine—brains. Is knowledge really comes from the stardust or road dust? Not really. But what is money doing here? If it comes out, it must enter economy like energy and matter. Does it come from the skies, like the golden rain from Zeus to Danae? Where does it go? Who owns it?

In my scheme of things, the answer is that money, of course, stays and circulates in the economy, unless that economy is a part of a larger economy. Money is a form of energy for exchange between autonomous parts or cells of economy. The parallel between ATP in living organisms and money in economic units is extremely close, although the functions of money are much more diverse. Money owes its existence to the granular (cellular or particulate) structure of human society with a human as the smallest atom

(some say *agent*). The institute of private property with the seal of ownership is the most important distinction between molecules and people, which makes lasting inequality possible.

Money has no value outside exchange. It cannot be produced by **economy** and excreted beyond its borders. It can be made by individuals because they are part of economy.

> **NOTE** (2016). Can I say anything original about money after Georg Simmel's *The Philosophy of Money* (See **Essay 55**) or even a textbook of economics? I will try, starting with a question: Why does money exist at all? My answer is that money exists within economy only because economy includes people with their natural shortcomings. In a society of machines money is not necessary: they communicate with people and between themselves electronically.
>
> Material money emerged in the era of materialization, while we live in a period of transition to the era of dematerialization and are already paying an ever increasing price. Yes, material money was information, but why was it material? Because information could be stored in the coin **irreversibly**, whether it was true or not. In debased or counterfeit money it was not, but the face value could not be changed as easy as with a keyboard.
>
> Return to materialization in some form is unavoidable and the fingerprint access to a smart phone is an example of a not quite convenient compromise. A new problem of the dematerialized world is the parallel currency that interferes with money: the value of human life, health, and wellbeing. In 2016, in a dispute between the FBI and Apple, Inc. about encryption, Apple argued that the lack of privacy will endanger the owners of the phones. That argumentation ignored the difference between the values of numerous human lives threatened by terrorists and the values of personal secrets unrelated to loss of life and health. Humans already begin to look like a nuisance in the world of modern economy. What is so special about them, anyway?

When the cow gets incorporated into economy, it suddenly turns into a cash cow. The only purpose of the cow's existence (measure of its stability, we can say) is no more its sense of being alive, breeding, well fed, happy, and pampered. It is economic performance, which depends not even on the cow owner's view of life and sense of being happy, but on the economy as a whole, which is outside the reach of human will, let alone the cow's.

This is where a god enters the picture of the world that is not ruled by individual human will and where Warren E. Buffett is the closest to the god human figure. In Antiquity, the god of economy was the multifaceted and multitalented Hermes of the Greeks. In Rome, it was the more focused Mercury. The need of a god is probably the ultimate reason for the current world resurgence of religious irrationality. People want somebody to own and take care of them in exchange for worship, whether sincere or hypocritical. Even those who already *have it all* may look up to *Heavenshire Getaway Inc*., and, all the more, those who *have a half of it all*.

The slightly corrected elephant of economy is shown in **Figure 11A,** where fuel combines the functions of both energy and matter. Money in **Figure 11B** is made and exchanged inside economy. Human labor, manual and intellectual, is also produced inside economy and it gets its energy from food. The latter is also produced within economy, as well as, in case of wild fish, is taken from wild nature. Of course, taking anything from nature is also economy.

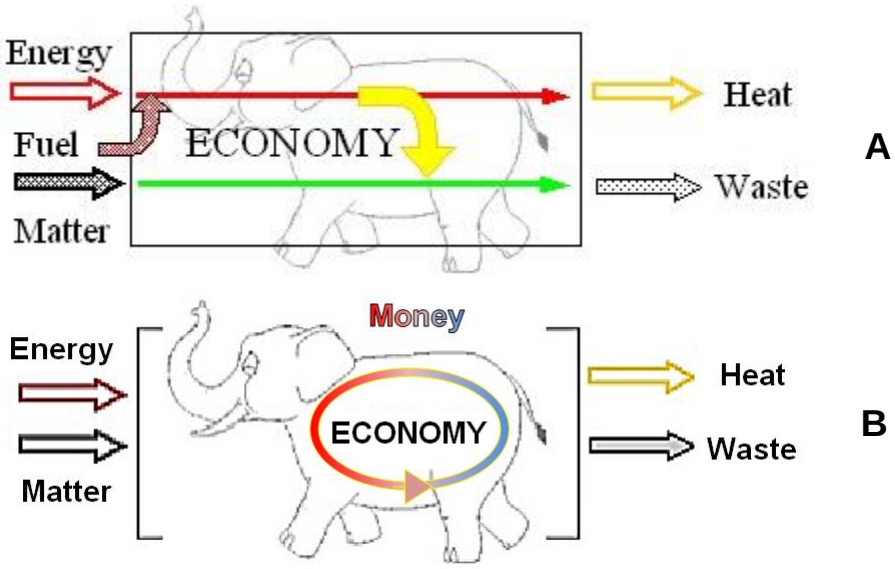


Figure 11. A. Fuel is a form of matter that turns into energy; B. Money is the blood of economy.

Looking at **Figure 11**, I realize that it is only a stage in the evolution of economy. Its conceptual minimalism may help imagine the entire process of emergence and development of the current global civilization in very simple terms. It also shows that as long as we have sunlight and cold space around, we can survive, but the difference between a human and a machine is, from a certain angle, just a matter of perception and that angle can get even much wider. As science has challenged God, it also challenges humans, which is no wonder, considering the relations between the Creator and creations in Creator's image. Avoiding gender-specific personal pronouns, I am under influence of women rightly challenging the domination of men.

Although economy based on mineral fuel is not to last, doing without oil and coal is quite possible. Elephants do not eat coal. Neither do they drink oil. But they need water. The elephant in **Figure 11** needs only a few buckets of water for the full picture.

Water and information are two things missing from **Figures 7, 8, 10**, and **11**. I do not want to complicate the **Figures** because neither water, nor information—in the form of DNA for the elephant and know-how for economy—are photogenic. The beauty of water is in the things that it reflects or in the surface ruffled up by the wind. DNA is boring, too. It is more economical to present them in words.

Water (fluid) is the universal substrate and condition of life. The removal of water makes dry food (fruit, sea biscuit) last indefinitely. But water (fluidity) is also an ideogram for the intrinsic chaos in various systems without which no change, desirable or harmful, is possible. Even money has something of water: liquidity.

Computer is an example of extremely dry system: nothing is supposed to happen in the computer unless initiated by the operator. Judging by the behavior of my computer, however, there is still some water from all the coffee spilled at Microsoft.

Abstract temperature is a measure of fluidity for all dynamic systems, i.e., systems with change. I am not sure Microsoft is hot anymore. Neither Microsoft, nor Google, nor even Apple is driven by human will. Long past that initial creative phase, they are driven by economy. The sure sign of that is involvement of IT giants in the cell phone business.

From the point of view of a chemist, information plays the role of catalyst: it makes happen what could, theoretically, happen on its own, at least for the time of eternity, but much faster and selectively. Temperature speeds up everything indiscriminately, while catalysis speeds up only a particular transformation of its substrate, and in both directions, if it is reversible. Thus, **Microsoft Word**, part of **Microsoft Office 2000**, which I hold in high regard, follows my will well, probably, because economy has not had any power over it since 2000.

As for ideograms, human hands are an ideogram for catalysis.

The three conditions of Evolving Complex Systems, therefore, are: hardware, software, and waterware (chaos). Economy needs human stupidity to be fluid. Imagine that everybody would make the best possible business and investment decision: nobody could do better than somebody else. Fortunately, no decision is good or bad until *post factum*.

At this point, I want to explain my attraction to elephants. It began in my childhood with my first looks at the elephant in the city zoo, but here I choose elephant to symbolize economy, wild nature, and organism as configurations of the pattern of life.

Now we can approach some most intimate chemical mechanisms of making money.



COUPLING

The rounded rectangle in **Figure 12** may signify a cell of a simple organism or the animal organism itself, however complex.

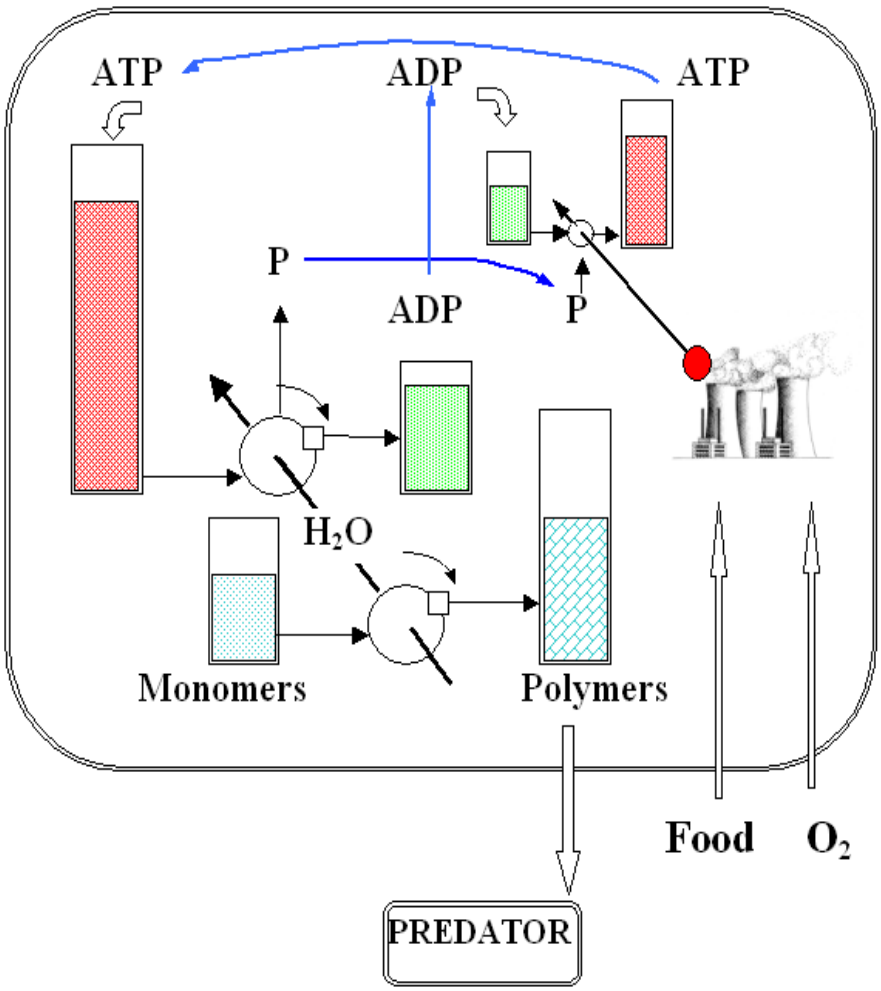


Figure 12. Machinery of life.

Food is slowly "burned" in a kind of molecular power station and the energy drives the **inequality pump** that turns ADP (adenosine diphosphate) into ATP (adenosine triphosphate) by adding another unit of phosphate (P), which requires a lot of energy. ATP is transported to the "equality pump" that works like a **watermill** coupled with a **manufacturing mill** that makes all kinds of things, such as assembly of monomers into

polymers, which also needs some energy to make it efficient. Of course, the monomers could snap to each other on their own, but we would wait for a significant time for that to happen and they would fall apart easier than they are formed, only to be pulled together again. Imagine clothes that need to be repaired every day. Moreover, imagine predatory clothes that hunt for other clothes to incorporate their fabric into themselves. Life is industrious, after all.

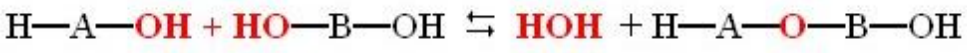
> My examples with mills are not accidental. They are my tribute to Warren Buffett, whose **Berkshire Hathaway Inc** started with a textile mill, as well as to my state of Rhode Island, where the water-driven textile Slater Mill started the Industrial Revolution in America around 1790. Some other mills that would become the seeds of **Berkshire Hathaway Inc** followed later in Rhode Island and nearby.
>
> Here is my opinion of Warren Buffett, one of the more benevolent gods of business: his brilliant idea was to concentrate on those investors who do **not need** their investments for everyday life. Those who do **not need** money **can make** most of it. That can be complemented, according to my personal philosophy inspired by Buddhism and the Greeks: those who **do not need** money **feel like** those who make most of it. The inverse does not hold. Those who **make** a lot of money **feel like** they need a lot more.

Figure 12 looks complex, but is in fact a great simplification of the biochemical reality. I simplified the reality in order to put both biochemical and economic complexity under the same pattern of the basic balance sheet.

My verbal description of **Figure 12** was miserably simplistic, but I needed it only as introduction to the question: how can the molecular watermill bring into motion the molecular production mill? More exactly, how can ATP snap together monomers such as amino acids, for example? I hope the answers will lead us to the secrets of money mills, while the history of the Slater Mill is open to everybody at its museum in Pawtucket, Rhode Island.

This is a chemical question and I cannot simplify it. I can only omit some aspects and details which can be easily found in abundance on the Web.

Biopolymers (proteins, nucleic acids) form by the chemical reaction of condensation which removes water from two parts to be linked together.



Or, simpler, but still acceptable:

$$A + B \leftrightarrows AB + HOH$$

The equilibrium of this reaction is shifted to the left, which means that the left state of the system is somewhat more stable than the right one.

ADP, which is A-O-PO_2-O-PO_2-OH (APP for short), adds another phosphate unit, H-O-PO_2-OH, (P), and becomes triphosphate, ATP, (APPP)

$$\text{A-O-PO}_2\text{-O-PO}_2\text{-OH} + \text{HO-PO}_2\text{-OH} \leftrightarrows \leftrightarrows \text{HOH} + \text{A-O-PO}_2\text{-O-PO}_2\text{-O- PO}_2\text{-OH}$$

Or, simpler, in shorter notation:

$$\text{APP} + \text{P} \leftrightarrows \text{APPP} + \text{HOH}$$

The equilibrium of this reaction is shifted to the left, which means that the left state is much more stable than the right one. Since the transformation is reversible, we can flip it:

$$\text{APPP} + \text{HOH} \leftrightarrows \text{APP} + \text{P}$$

Now it is shifted to the right.

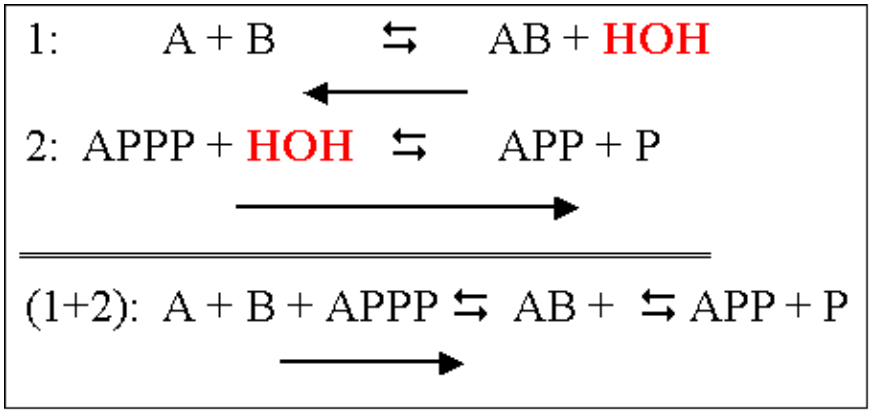


Figure 13. Thermodynamic coupling of condensation and hydrolysis of ATP.

When we combine the two **reversible** systems by adding their equations (water on both sides can be omitted) as in **Figure 13**, the resulting state of equilibrium will be shifted toward AB because the interaction of APPP with water leads to more stable state than the subtraction of water from A and B (condensation) in separate reactions. This sounds ugly to chemical ears, but it might tell something to an economist about what **dynamic** equilibrium means in chemistry.

In the simplest language, to fill up a bucket with a hole in the bottom, you have to keep pouring water faster than the bucket loses it. An organism—or economy, culture, institution, project, species—dies without a constant supply of energy and matter. The pattern of life is fluid, but highly ordered, and with an intrinsic hole in the bottom.

In equilibrium, all possible transformations go back and forth all the time, so that no bond remains stable for too long, but the statistical picture remains **static**. This is something that rarely, if ever, happens to the market, and only for a short time. Moreover, market and life in general have nothing to do with equilibrium: the right word is **steady state** or **stable state of flux**.

In even more primitive language, APPP (i.e., ATP), has a higher **affinity** to water than condensed monomers AB and this is how the high energy ATP "sucks water" out of A and B, making them stick together.

The word **affinity** has its rich history in chemistry. It meant decrease in free energy before the very term **free energy** had been invented. High affinity to a change means that the final result is more stable (free energy decreases) than the initial state.

How do we arrive at the final state does not matter, but it matters a lot how fast.

This is the main message of econochemistry because it is the main message of chemistry itself. I hope Pattern Theory will someday develop its Kinetic Pattern Theory subdivision.

Figure 13 portrays what is called thermodynamic **coupling** of two chemical reactions, which is how ATP supplies energy to changes in chemical bonds in living cells. The coupling of two reactions occurs through a molecule which is **common for both**, like the common shaft of the turbine and electrical generator in power stations. Obviously, such system requires a constant supply of ATP or, in more general terms, energy in order to remain not in equilibrium but **a steady state.**

After all that verbal contortions I can say with relief that this is the same pattern as in coupling the heat engine with the generator, water turbine with a pump, and watermill with cotton mill.

Coupling could be the key word to economy itself. Let us look at the biochemical coupling from a business perspective, which is by necessity anthropomorphic.

The monomers **transfer water** to ATP. Water is a very material thing. Thales of Miletus, the very first great simplificator of complexity, regarded water as the primary substance of all things. Instead, the monomers get the energy necessary for their long awaited union. To look into the other end of the telescope, ATP finally satisfies its eternal thirst with a gulp of water, for which it pays with almost all its wealth of energy, and dissolves in pleasure, until it wakes up to the fresh morning air restoring its energy in the world famous Mitochondrion Resort.

To me it looks very much like buying a bottle of water with cash and drinking it up. No water, no cash. The seller of water can make another bottle. I have to sell myself to earn money. A strange kind of equality. Is this disequality?



SELLERS AND BUYERS OF THE WORLD, UNITE!

There are two major participants in the act of market exchange: manufacturer-seller (**SELLER**, for short) and **BUYER.**

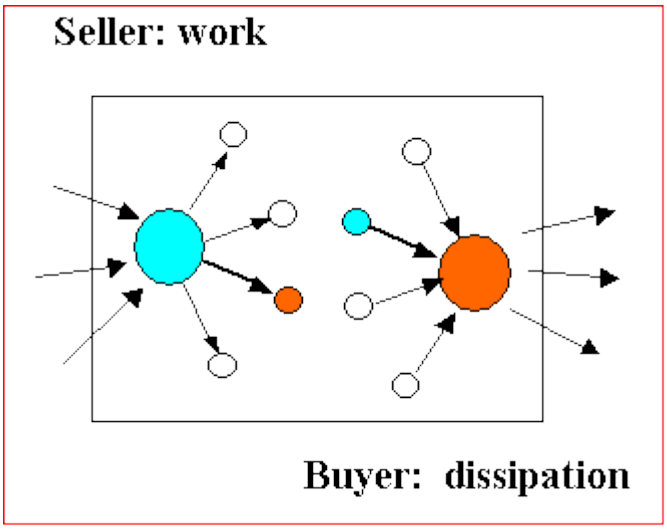


Figure 14. Creation and dissipation.

The example with water (it could be house, airplane, company, scientific research) assigns to the buyer the function of dissolving in pleasure. The pure fluid merchandise dissipates until the sun resurrects it in the form of rain. The buyer loses part of his ability to buy water or many other **different** things he needs for life, really or in imagination. **Figure 14** illustrates my point.

The seller uses the buyer's money to make more **identical** bottles of water and sell them to **different** customers, stashing part of the money for himself in the role of buyer.

I suspect that the relation between **SELLER** and **BUYER** is a kind of coupling. Money, which is a form of energy analogous to **ATP**, is exchanged for a merchandise that cannot be found under your feet. It should be made, which requires energy in the form of money. For coupling, however, two systems should have a common component that participates in the balance sheet. **Figure 15** summarizes my point that the common component, the turbine-generator shaft, so to speak, of the coupling is the **identity** of the buyer and seller: they are the same. Unless you have something to sell, your labor, for example, you cannot buy anything and unless you buy what you need for life and work, you cannot make anything for sale, even yourself.

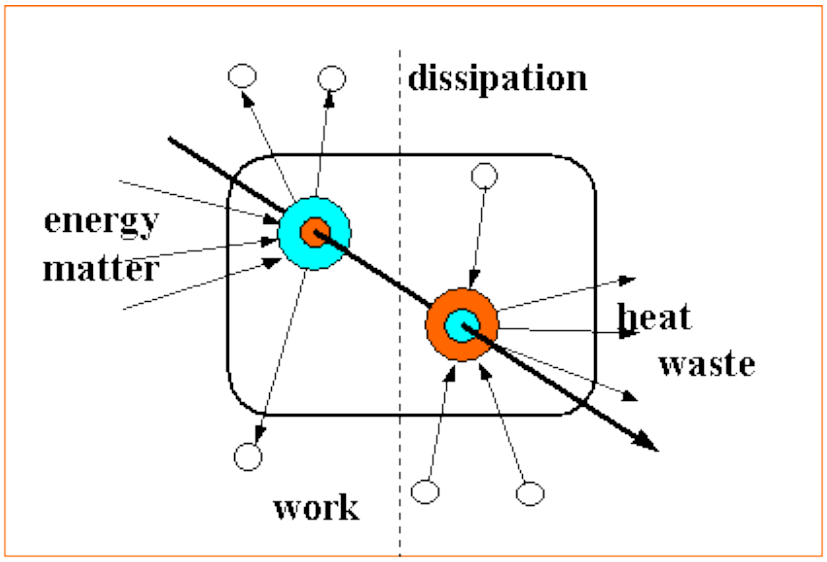


Figure 15. Creation coupled with dissipation. Economy arises from the double identity of person as both buyer and seller.

Figure 16 illustrates the asymmetry between modern production and consumption. Mass production is more regular than consumption. It requires less energy for overcoming the uncertainty of choice, but makes the existence of seller less predictable. I believe this is the other side of the asymmetry between buyer and seller that I refer to in **Essay 55**.

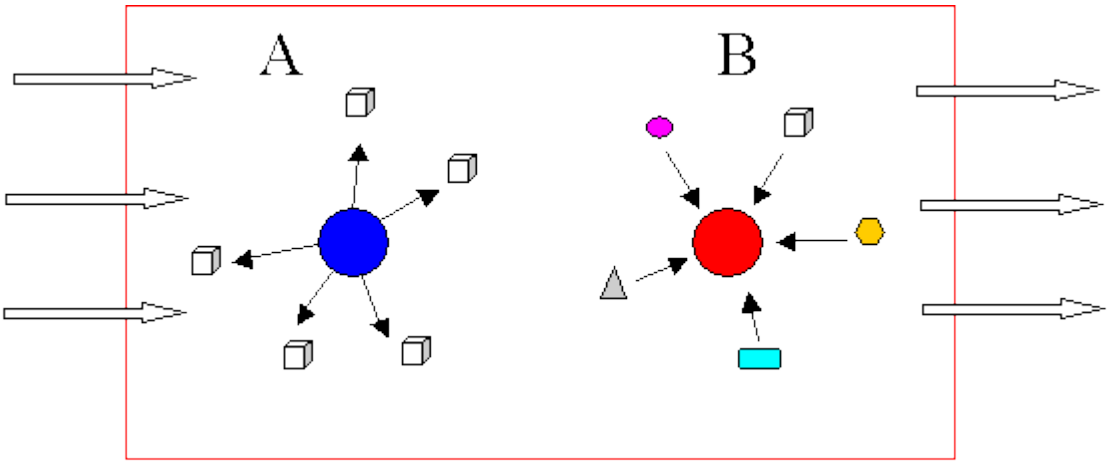


Figure 16 . Mass production (A) and individual consumption (B)

The seller, therefore, makes money by positioning himself or herself upstream on the flow of energy from the sun and the mineral fuel to the junk yard. Then the advantages of mass production, advertisement, and growth could be fully exploited while the

mineral fuel lasts. It is my intuitive impression, which I cannot substantiate by numbers—but economists could try—that the oil producing countries (Saudi Arabia) and those that supply raw unskilled cheap labor to world economy (China) accumulate huge wealth because they keep hand on the tap from either mineral energy or from the energy of sun over the rice fields. The sunlight, accumulated in the starch of Chinese rice, assembles toys for spoiled American children, young and adult. Naturally, whoever keeps hand on the tap of energy in monetary form, keeps the change having sold his beer. The difference is that oil is in very few hands, Chinese labor is controlled by even fewer hands, but a lot of people compete for money kegs.

How the large sellers (and, therefore, large buyers) driven by the powerful instinct of growth, comparable only with sex, crowd out the small fish down the energy river is a subject of economics proper, as well as econophysics, but not of econochemistry. One thing is obvious: it results in inequality, no ethical strings attached.

> **NOTE** (2016). Inequality is the norm of the nature. In **Essay 57, The Few and the Many**, I connect hyper-inequality with the ability of the few to by the best and most productive **money-making machine** (MMM). From this page of **Essay 56**, I am also looking back, with cautious respect, to Karl Marx who, with my hindsight, saw labor as a kind of energy and ownership of iron elephants as a kind of power to keep labor cheap. Today, I cannot believe my eyes looking at the Verizon workers on strike and the crude foulmouthed billionaire and poor socialist as presidential candidates .

Finally, **Figure 17** illustrates the essence of money in addition to **Essay 55**. A chemist may be tempted (as I was) to present a market exchange as a chemical reaction of exchange.

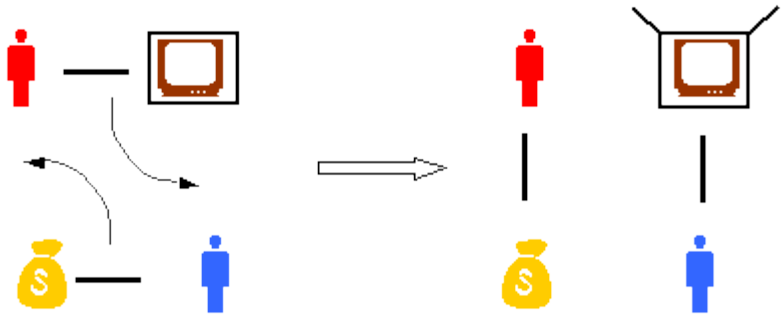


Figure 17. Quasi-chemical reaction of exchange.

The chemical reaction, however, is a rearrangement of bonds between material objects, to which money does not belong. The question, however, remains open about information, art, and, probably, software. In what way information and art are similar to money is yet another intriguing topic.

In the original marketplace, people exchanged goods at the same place and time, exactly like molecules exchange energy. The barter deal was, from the point of view of physics, a

collision. But exchange of matter does not require the exact identity of atoms and molecular fragments, and a copy, always in abundance, is as good as any other copy. All civilizations were built on the use of human beings as interchangeable objects by a few individuals. All civilizations were built on the use of interchangeable objects and a few unique ones.

> **A chemical digression.** The molecule of water transferred in chemical coupling from condensing molecules is not the same as the one that splits ATP into ADP and phosphate: ATP, ADP, water, and two reagents act in a chemical marketplace where zillions of water molecules are on sale. Without the excess of water there would not be equilibrium. In the eyes of a romanticl chemist like myself, the first coins in ancient economies were the droplets of rain that fell on the dry dusty barter place and turned it into fluid economy that could flood the world and drown it with only the spires of cathedrals sticking out.

Chemistry is as much the science of everything as modern economics is. There are many other parallels between economy and biochemistry—after all, humans are live beings—but I feel compelled to apply constraints to myself in order to have any chance of performing useful work. My last cry from my heart is: in modern economy humans are as much things and things are as much alive as cows are animals and cellphones are things. **Humans and Things of the world, stay apart!**



WHAT IS ECONOCHEMISTRY

Even though I cannot lose money by mental experiments with it, I cannot make it, either. I feel free to at least take a break and look back.

I hope I have managed to illustrate in **Essays 53** to **56** , as well as throughout **spirospero.net**, nothing more than a direction of thought which is potentially complementary to econophysics: econochemistry. Its core consists of four points applicable to all **exystems** (Evolving Complex Systems).

1. A lot of understanding how exystems work can be obtained from comparison of **two stable states separated by an unstable transition state**.

2. Given the initial stable state, the next stable state is the **result of a few fastest** changes.

3. The **speed of change** is determined by the **stability of transition state**: the higher stability, the faster change.

4. For exystems, the change in stability of a state is **roughly a sum of local** increments participating in the change.

The essence of chemistry is the representation of complexity in terms of simple atomic entities. In this sense, Pattern Theory (Ulf Grenander), in which **configuration** corresponds to **state**, is generalization of chemistry by building on **atomism**, one of the oldest scientific ideas of humankind.

The reason why I am so much intrigued by economics, the subject alien to me, is that economics is undergoing a transformation into a science of evolving complex systems comprising society in all its manifestations and its impacts on life, culture, climate, nature, and the very fate of the planet. Economics does it by putting a price tag—or at least a number—on everything. However sacrilegious this may seem to older generation, including myself, this trend follows the traditional roadway of science: for a start, put a number on the object of study. But the science separates itself from the crowds. Pattern chemistry uses similarities instead of equations. Image and metaphor are examples of similarities.



THE FUTURE OF INEQUALITY

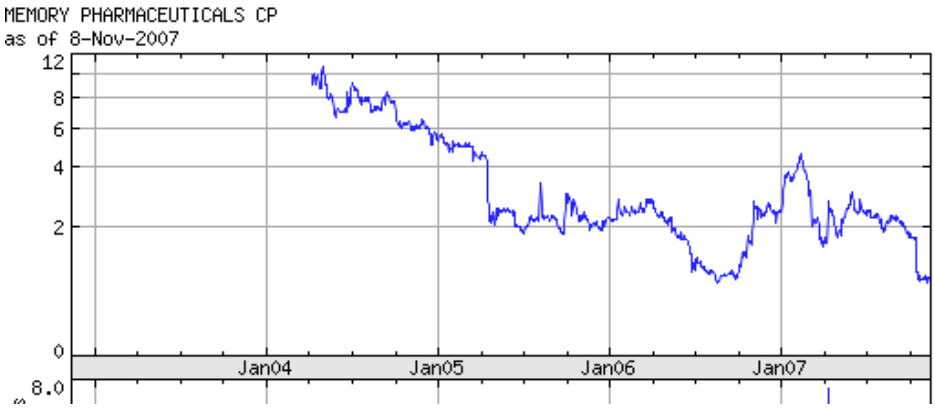
Essay is an emphatically personal genre. To conclude, I want to look at the future of inequality from my personal place in the world.

Inequality, partitions, ladders, and gradients are necessary conditions of life and economy. They are not supposed to exist in the physical world where everything is subject to mixing, attrition, and collapse. The inflow of energy and the very design (software) of **exystems** ensure the constant repair and renovation of the systemic hardware.

The waterware—chaos—guarantees that something always happens, unless the water is frozen.

I limit myself only to one main point: the future of inequality depends on the balance in the struggle between individualism and globalism.

I am personally terrified by the prospect of the humankind returning to its biblical origin as the new Noah's Arc: a single, however giant, ship for all humans and their pet creatures, with its saints and sinners, predators and prey, masters and slaves, dictators and their jubilant subjects. I instinctively foresee the loss of freedom under strict maritime rules, impenetrable partitions between the decks and passenger classes, the shrinkage of the ship menus, the tags on the sleeves, and the super-monotheistic ultra-orthodox religious service without attending which the dinner will not be served. I am afraid that all passengers will ultimately become the rowing crew. I am afraid of the global economy in which everybody will be equal as a cell of a giant Leviathan's body or, even worse, of its corporate organ. My imagination balks at the prospect of energy crisis that will lead to the overboard proscription lists.



[As of December 31, 2008, Memory Pharmaceuticals Corp. was acquired by Hoffmann-La Roche Inc.]

I am even more terrified by the human invasion into human mind, also driven by economy, as all modern science. I enjoyed reading Eric Kandel's "*In Search of Memory*," but the Bigfoot of Business left a faintly unpleasant odor in one of last chapters. The above stock chart is its imprint, easily found in the annals of economy.

(Yes, I know, it all is for the sake of humanity and for treating terrible illnesses… Good intentions, etc., etc. It is not the economy, stupid, etc., etc.)

I am afraid of both inequality and equality, but I see that the future of equality is coupled with the future of inequality. I understand that money sustains the inequality and, literally, liquidity of human existence. In a very old-fashion way, as somebody who has read a lot of books written by dead white men, I also understand that neither money nor gods come even close to the power of ATP in human cells.

DO WE NEED TO FEAR THE FEAR ITSELF?

What do I fear? I see globalization as the third phase of Industrial Revolution. The second phase has been the Information Revolution. If it all seems like too long for a revolution, I still would call it revolution because two or even three hundred years is a short time as compared with the previous history of humankind. I see the Industrial Revolution as a global fire in which carbon and hydrogen are burning into water and carbon dioxide at an accelerating speed. It would take a lot of time and pain to turn all that back into carbon, hydrogen, and oxygen and to come to a sustainable steady state.

I am afraid that the traditional social acceptance and even celebration of inequality dressed in the robe of equal opportunities may end up one day. When society is in too much pain, those who suffer most may notice the wounds of unequal suffering on the body of society and call the disease *Disequalitis morbis*. Then they can turn to a savior of the nation, as the Germans once did and people in Venezuela seem to have done recently. They might decide that to have just one king for a nation is better than to have five hundred uncrowned princes. Some could turn to *The Communist Manifesto*, others to *Mein Kampf* , Darwin will be burned in stoves made of empty oil barrels, the eggheads smashed, and *Out of Many, One* will be taken literally.

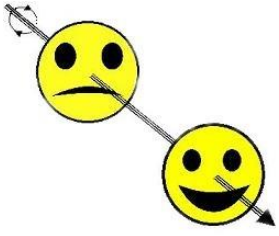
In the era of the Internet, cell phones, dumbing media, and mixing religion with politics, it is easy to imagine the global waves of instability, psychosis, and violence, especially because money is the true world religion. As any religion, it is as capable to unite people as set them against each other. In rich America it unites, in poor Gaza it divides.

So what? Isn't history given to us for healing all wounds?

In global economy ONE means really, really, really one. Only those who lived in totalitarian Russia, Romania, or North Korea know what ONE means. You can emigrate from the global ONE to the moon, only to start a new oppressive Puritan colony.

I believe in the creative productivity of fear which makes us ultimate winners. If we do not fear, “it” will quietly engulf us and digest alive, singing lullaby.

The buyer and the seller inside me are not on the same shaft. Pessimist and optimist are.



THE BOTTOM LINE: $ 0.55. I started with one cent. Not bad!

2007

ESSAYS 57 to 60 see LAST ESSAYS http://spirospero.net/LAST_ESSAYS.pdf)
ESSAY 60: Art as Nexistence (2016). (http://spirospero.net/artandnexistence.pdf)

The last revision of Essays 1 to 56: April 2016

Some ideas of the **Essays** have been developed in INTRODUCTION TO PATTERN CHEMISTRY: http://www.spirospero.net/INTRODUCTION_TO_PATTERN_CHEMISTRY_parts1to4.pdf or: http://www.spirospero.net/INTRODUCTION_TO_PATTERN_CHEMISTRY_parts1to4.pdf

At SCRIBD: http://www.scribd.com/doc/55173251/Introduction-to-Pattern-Chemistry-Parts-1-4

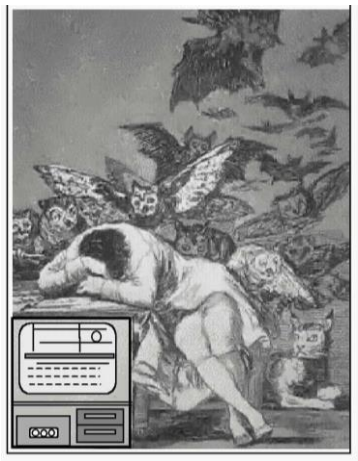
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email

Yuri Tarnopolsky

ESSAYS

Essays à la Montaigne



2001-2016

LAST ESSAYS
(57 to 60)

ESSAY 57. THE FEW AND THE MANY

Pattern chemistry of 2012 Elections

Essay 58. ALL RATIONAL MINDS ARE ALIKE; EACH IRRATIONAL MIND IS RATIONAL IN ITS OWN WAY

Pattern chemistry of rationality

Essay 59. THE KNOT

HUMANS, IDEAS, THINGS, AND EVOLUTION OF ECOSPHERE

Essay 60. Art and Nexistence

Essays 1 to 56: Essays complete.
Simplicity. **Spirospero.net**

ESSAY 57. THE FEW AND THE MANY

Pattern chemistry of 2012 Elections

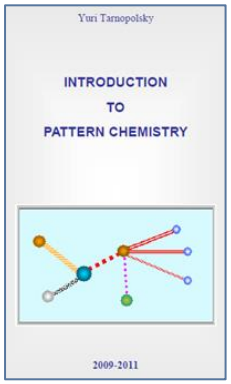
It is the last quarter of 2012 and I am celebrating my 25 years in America. It is a quarter century, over 10% of entire USA history as independent nation, and about one third of my own life.

I am coming back to my Essays à la Montaigne five years later after my ESSAY 56: OUT OF ONE MANY (2007). But the problem of ONE, FEW, and MANY keeps haunting me. It is the last big mystery of America after my 25 years here.

During the break, the core ideas of **Essays 51 to 56** have been developed into :

INTRODUCTION TO PATTERN CHEMISTRY
http://www.spirospero.net/INTRODUCTION_TO_PATTERN_CHEMISTRY_parts1to4.pdf
or http://www.spirospero.net/INTRODUCTION_TO_PATTERN_CHEMISTRY_parts1to4.pdf
or: http://www.scribd.com/doc/55173251/Introduction-to-Pattern-Chemistry-Parts-1-4 (SCRIBD)

This Essay uses many ideas of the INTRODUCTION TO PATTERN CHEMISTRY, a direction of thought influenced by Pattern Theory of Ulf Grenander, which I had discovered by chance in 1980. Here I continue some threads and weave in some new ones. This time the key words are **power, politics, vital interests**, **inequality**, and **voting**. Money and patterns are default key words for "econochemistry," as I call the patterns of the cohabitation of humans, things, money, power, and ideas on earth.



I refer the reader to the INTRODUCTION and my entire site **spirospero.net** for details which I omit here. I also try to limit the number of links. They die out, but Google, while morphing into something new, is still spirited enough for quick search. Companies die out, too, but so do people and nothing can be done about that.

1. PATTERN THEORY AND PATTERN CHEMISTRY

Each time I turn to patterns, I try to approach the concept from a different angle and there are at least 360 of them, most still unexplored. In a few words, my current take is as follows.

Laws of physical nature for all practical reasons are constant at least within the solar system. This is why physical equations include the equals sign **"="**. Life on earth and the human condition, however, evolve. Equations do not describe history and economy and this is why physics in investment banks contributed to the Great Depression. Pattern theory substitutes similarity for equality. Pattern chemistry focuses on the processes of change and uses patterns instead of states to understand and foresee large-scale and long-run processes in social and individual evolution. Pattern chemistry is a mental instrument to deal with novelty.

We do not need pattern chemistry for anything as old as our planet, which is the subject of hard physical sciences. But the old future is contradiction in terms. The future is neither old nor new: it does not exist except in our minds and in a great variety of alternatives. And yet we have an irresistible desire to look into the time ahead although some of us would be happier not knowing it. I am going to talk about the great whatever around the corner for a particular reason: it is the best testing ground for pattern chemistry. Patience is the only tool for experiments with the future. We might wait a few years for the result.



Japan, tsunami of 2011

Since human imagination produces almost all possible and impossible at the time pictures of the future, we might never know if the right guess was accidental. Future is always a lottery.

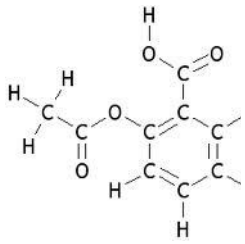
Patterns are the counterparts of physical equations for *exystems*, a contraction of **E**volving **C**omplex **S**ystems (**ECS**ystems = exystems). Like the laws of physical world, they are the invariants of change in human condition. Pattern is something we can predict more or less accurately about the future. The horizon of time is constantly receding, occasionally coming back as a tsunami wave and we have to finally learn what is the safe place to build our future.

The past of humankind was born in the process of evolution and so is the future. Most of the future—its details and particularities perceptible by senses—is dark, but part of it is illuminated by long-term patterns visible only to reason. There is also a future novelty unpredictable by definition, but born out of imagination. Our imagination gives birth to countless progeny and the problem is to assign likelihood to different outcomes. This is exactly the problem a chemist faces considering all possible rearrangements of atoms in a mixture of substances. My central

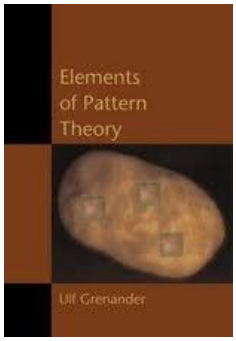
idea is that the way the chemist makes a prediction of the most probable outcome can be used not only for molecules but also for the products of imagination provided they are represented as structures of simpler entities. In terms of Pattern Theory, the structures are *configurations* of *generators*.

Mathematics includes the study of such objects into its graphs theory, but, unlike chemistry, it is hardly interested in the individuality of each of countless combinations of points and lines.

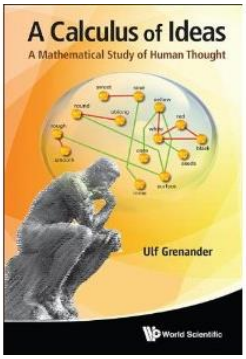
For example, a **mathematical** combination of points C, O, and H can look like the formula of aspirin on the right, but the **chemical** image of the same graph includes a lot of individual data about these particular white crystals, their melting point, spectra, physical properties of the bonds, including lengths, angles, and energies, what can happen to the bonds at various conditions, and even the human aspect and history of this combination of atoms. It started, by the way, at least as early as 1500 BC, long before it was isolated (1823), synthesized (1853), produced and patented (1897) and has been currently used (gladly by myself, too) almost as a panacea and an inexhaustible source of profit for the pharmaceutical industry (which I absolutely do not trust).



Aspirin



Pattern Theory of Ulf Grenander considers anything within human knowledge that can be represented as a combination of elementary objects (generators) and bonds between them and studies the properties of such combinations (configurations) as resulting from the properties of the generators and bonds, quite like chemistry. Moreover, it never loses the connection between the skeletal representation and the complex object of the real world.



Ulf Grenander, *General Pattern Theory: A Mathematical Study of Regular Structures*, Oxford University Press, 1994.
Ulf Grenander, *Elements of Pattern Theory*, The Johns Hopkins University Press, 1996. Ulf Grenander, *A Calculus of Ideas: A Mathematical Study of Human Thought* , World Scientific Pub Co Inc , 2012.
Numerous sites on the Web.

The chemical combinatorics arises from the idea that combinations differ not only by the "weight" of elements, but also by the way they are connected and the "strength" of bonds between them. Chemistry is complexity incarnate.

The random component and the similarity of the processes in the mind to chemistry was noticed and eloquently depicted by Douglas Hofstadter in "Jumbo" of *Metamagical Themas: Questing for the Essence of Mind and Pattern* (Basic Books, 1985) and "careenium" of *I am a Strange Loop*, but he did not pursue the idea head-on as a mathematical problem. While giving a lot of attention to "patterns" understood in the trivial sense of regularity, repetition, and order, Hofstadter seems to have missed Grenander's Pattern Theory—as most other writers on patterns. This is the

strangest twist in the "strange loop." Hofstadter has been rightly and forcefully promoting the idea that "analogy" is central for the work of mind, while Grenander's "similarity" is already the central well-defined idea of Pattern Theory. Still, I would borrow from Douglas Hofstadter a phrase that serves as a great epigraph to Pattern Theory:

Where there's pattern, there's reason.
(Douglas Hofstadter, *I Am a Strange Loop*, Basic Books, 2007, p.117)

Chemistry is not associated with randomness in popular perception. While the pictures of a probabilistic mind and probabilistic world are becoming more conventional, replacing the determinism of classical science, it is appropriate to remind that individual acts of chemical change are entirely probabilistic. The main chemical notion of concentration is nothing than probability to find a certain molecule in a volume of substance. If chemistry looks like a hard deterministic science, it is because it deals with large numbers of molecules. Small numbers of molecules—countable on the fingers of one hand—can be as little predictable as small groups of people. Mutations and transformations of genetic material are the best example. The act of a chemical reaction that can run in two alternative directions is as random as the conception of a boy or a girl.

Chemistry can be characterized as the **study of probabilities on structures**, which is exactly how Ulf Grenander defines Pattern Theory.

I am not a mathematician. Thinking as a chemist, I am interested in the **intimate mechanism of the transition** from one configuration to another. What I want to borrow from chemistry and add to Pattern Theory is the side of chemistry less known to outsiders: kinetics, i.e., aspect of speed. In the real physical world, nothing happens in an instant. While "what can theoretically happen" is a combinatorial question, "what will indeed happen" is a kinetic question because complex systems have a lot of alternative directions of change and it is the fastest alternative that wins, if there is any.



When we write $y = x^2$, it would be meaningless to ask "what happens between $x = 2$ and $y = 4$" or "how soon y becomes equal 4 after x takes value 2." An abstract mathematical operation does not involve time. The question makes sense when a calculation runs in human head, supercomputer, or something as thin as the supermodel i-Pad of the newest fashion show. The speed of a digital process in a computer is a real issue because it consists of a number of steps, none of them instant. Different algorithms can achieve the same goal at different times.

A chemist deals with the question "if **A** turns into **B**, what happens along the way from **A** to **B**" because this is the key to the question "how fast **A** turns into **B**." If **A** can turn to **B** or to **C**, the result will be the fastest transformation. For example, if presidential candidate **A** faster persuades the electorate that he is better than candidate **B** and faster crushes the arguments of the opponent, he has much better chances to win the vote. If both candidates had more time, the opinion of the voters could change in the long run, but the election date is fixed and human minds have their own limits of speed and unlimited reservoirs of illusion.

In addition to probability, energy, and stability of configurations, I draw attention to the **speed** of transitions from one to another, using the chemical (as well as military, political, and economical) principle that the **fastest** wins. Pattern-chemical kinetics **cannot** predict the time sequence of real life events, but it could give at least some framework to compare different alternatives. Besides, I believe that it is exactly what the mind does: it offers a competitive marketplace to thoughts. We think in patterns, especially when no hard knowledge is available, as it is the case in politics and human relations in general.

This is how we can cast some light into the darkness of the future. But the past has its dark basements, too. What can we say about the most distant past in a long history of a complex system, from life on earth to global civilization? The present exists. All we need to observe the future is a comfortable chair and little patience. But what was in the beginning of everything and what will be in the beginning of everything new? Asking this kind of questions, I am looking for a science of not complexity, but simplicity. But we do not need any science to guess, in general terms, what there is in Mitt Romney's mind that he defiantly keeps under locks.

I do not believe any complexity of thinking can make the complexity of the real world understandable. This is why our elections are designed for dummies: there is simply no time for education on either side of the voter-politician divide. Besides, telling the truth in politics can be suicidal while we are in a pursuit of happiness. "For in much wisdom *is* much grief: and he that increaseth knowledge increaseth sorrow." (Ecclesiastes, 1.18).

Can we predict the outcome of the Elections 2012? I cannot. In some instances, the political analysts can do this pretty well just by counting all pros and contras for each candidate. But if the bottom lines are very close, it is hardly possible. To compare with chemical reactions, we would have approximately equal mixture of two possible products, obamene and romniol.

There is always an abstract chance to influence voting at the last minute, as it happened in Spain in 2004 after the Madrid train bombings. It is only a matter of time before some political desperados try this in America in the atmosphere of Cold Civil War, which more and more becomes religious, i.e., irrational.

2. THE DIN OF WAR

I wrote Essay 43: The Cold Civil War in America in 2006. The title says it all.

In August, 2012, I am waking up from my five year long hibernation to find that my dreamlike visions are reality. **The latest news from the front:**

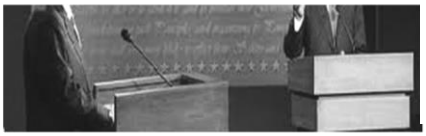
"Texas Democrats are calling for the resignation of a Republican elected county judge [Tom Head] who warned this week that the nation could descend into civil war if President Barack Obama is re-elected."
Texas Democrats: Judge who said Obama could trigger civil war should quit
By Josh Levs, CNN, August 24, 2012. Judge Head's interview.

"One of us (David [Gergen]) has been attending conventions for some 40 years and has witnessed a distinct change in tone; listening to the hot rhetoric in both conventions in 2004, it suddenly became comprehensible how the country could have wound up in Civil War back in 1861 after another election full of ramifications for the nation's future."
Election a stark choice on America's future**.** By David Gergen, CNN Senior Analyst, and Michael Zuckerman**,** Special to CNN, August 24, 2012.

LUDOWICI, Ga. — Four Army soldiers based in southeast Georgia killed a former comrade and his girlfriend to protect an anarchist militia group they formed that stockpiled assault weapons and plotted a range of anti-government attacks, prosecutors told a judge Monday.
Military Terror Plot: Murder Case Uncovers Terror Plot By 'Militia' Within U.S. Military
By RUSS BYNUM 08/27/12



Hot Civil War



Cold Civil War



Trench warfare

America's war with itself

America is in the state of Cold Civil War and it has enough firearms in private hands to wage a hot one.

The election of Barack Obama brought the American Cold Civil War to a stage reminding of WWI: trench warfare, poison gas, political hysteria, the cull of the brightest and bravest commanders, and opening the gates to wild opportunists.



IT IS THE BLUES!

The potential mainstream national leaders are being poisoned in the womb by TV ads, Internet, perspective of swiftboating, and crawling of investigative ants in their personal life. The best and the worst of the formerly excluded off-mainstreamers steps in. We are evolving and watching the course of history at the pace of a TV serial.



IT IS THE REDS!

I chronicled the previous elections in INTRODUCTION TO PATTERN CHEMISTRY (**Part 2**, **DIARY OF A FERRIS WHEEL RIDER)** referring to patterns going as far back in history as the siege of Masada. This pattern is still rock-solid. This time, the content of the mind of the presidential candidate Mitt Romney is an aloof fortress on top of a rock, although defending his Masada "no matter what," the candidate can end up by political suicide. But in this Essay, I am more interested in the content of the voters mind.



I am far from extrapolating the similarity of American political life to that of Europe of the post-WWI years, but not too far. Nothing is too far in patterns—only in ossified formulas. The ferocious militancy combined with the military-like discipline of the Republican Party, paradoxically deferential to threatening figures like the grey cardinal Grover Norquist or the astounding Jacks-in-the-box of the Tea Party, do not look good in the pattern telescope focused on the twentieth century. After its first victory in 1994, the Republican Revolution looks more like a jihad than WWI.



In this atmosphere, no experienced, charismatic, energetic, ambitious, intelligent, moderate, centrist, honest, decent, progressive, rational, and mainstream person (what an improbable combination!)—neither Democrat nor Republican—can step into the airport scanner of the media with his or her life, wallet, private parts, and the skeletons in the suitcases. The minorities have their word. It was the mistrust of non-Roman generals that contributed to the fall of the Roman Empire.

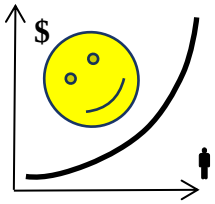
The Republican militants and ideologues are nervous. They are afraid, but of what?

I believe they are nervous because they represent the vital interests of a minority of Americans. A party of a minority in a democracy is naturally bellicose: it feels that it has nothing to lose in war because it has a lot to lose in peace. How a minority can win a majority of votes is the greatest trick of the not so long history of democracy—the trick performed, nevertheless, quite a few times. My guess is that it is because democracy quantifies and weighs votes, but not the temperature of voters' intentions. The mass media can operate both political ovens and fridges, not to mention distorting mirrors. Maybe democracy should protect not only minorities from aggressive majorities, but majorities from aggressive minorities, too. But without hotheads, disruptors, heretics, and fanatics, our history would freeze.

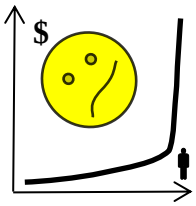
The membrane separating democracy from autocracy is the thinnest when there are only two parties comparable in strength: it could not be any thinner. **From two parties to one there is only one step.**

The gallery of patterns of history in my mind, some personally witnessed, makes me worry. They also signal caution. Neither the post-WWI Germany, nor Communist Russia had ever known anything close to successful, fruitful, and stable democracy of the American or British type. I explain the American success, now under question, by the unique diversity of American society, which compensated for the lack of organized political diversity. I explain this political minimalism by the might of the dollar, which limits the access to the political club. Money is power, and if it is in few hands, so is power.

Can a real vigorous flaming democracy burn itself out? What can save it? Business? Commerce? Religion? War? Ideology? Culture? Morals? Science? Ignorance? Pills?



Is it the economy, which today engulfs all of the above? Isn't it the economy that unites the society and puts everybody on the visually **consistent** chart? By *consistent* I mean a curve not only mathematically continuous, monotonic, and smooth, but also of little changing curvature. In other words, it is a line without clearly distinct segments and sharp local changes. Consistency would mean that we are really one nation, from poor to rich, "out of many, one," unlike the French society in 1789, or Syria today. But what if the consistent shape was bent into two distinct segments and the prosperity chart looked like the spread wings or the obtuse angle of a boomerang? This happened only twice in the last 100 years of American history: on the eve of the Great Depression and the Great Recession.[1]



What is economy, anyway? Throughout history, economy meant:

An **economy** consists of the economic systems of a country or other area; the labor, capital, and land resources; and the manufacturing, production, trade, distribution, and consumption of goods and services of that area. (Wikipedia)



IT IS THE ECONOMY!

Since the first historical records, the political currency used to be human body, managed by a whip, crucified, hanged, burned at stake, cut short by a guillotine, pierced by bullets in wars, adorned by handcuffs, and stored not in banks but in prisons and concentration camps. Economy today, at least in America, includes politics, making laws and presidents, and regulating personal life. It uses dollars instead of bullets and knives, unlike in Syria and Afghanistan, and it manipulates human mind by TV ads, speeches, web sites, and church sermons.



Already dreading the last stage of the 2012 campaign and the hanging in the balance elections where people are going to vote for their vital interests, I am asking myself the question which has already been asked by many mystified intellectuals: ***why do people vote against their vital interests***? How can a minority dominate the majority and recruit about a half of it?



Indeed, how can the two votes be so close? This diverse society of ours is so balanced in its political choice that in the Elections 2000 it looked like the Buridan's Ass ready to die of hunger between two exactly equal piles of fragrant Florida hay. Finally, the (numerically) odd US Supreme Court, less balanced by design, gave it a kick in the right side of the butt.



[1] Robert Reich, a tireless champion of anti-inequality, offered his own pictorial metaphors of inequality.

NOTE: It is as difficult for me to confess that in 2000 I voted for the right side of the butt as for Mitt Romney to show more than two tax returns. I am still registered independent, but I don't vote for the right side of anything anymore.

Pattern Theory is a search for simplicity in complex objects. So are chemistry and pattern chemistry. Science can be complex because it calculates complex systems in detail and is paid money to be exact. It works well because it can: the laws of physical nature in our galaxy have not changed in million years and mathematics has its own self-imposed laws, which, unlike human laws, are unbreakable for con artists.

Trying to solve the voting mystery, I leave the science of complexity to academic science. It is certainly not for most voters. I believe in the science of simplicity. But when I see simple reasons, I often can't believe my eyes.

3. SIMPLICITY

Even very complex **chemical transformations** leading to very complex substances consist of simple steps and can be started from pure chemical elements. I formulate here a universal **pattern-chemical** principle of evolutionary simplicity. I put it into a frame just to show off, but in essence it amounts to the tautology: spontaneous emergence of improbable systems is improbable. The way to break the tautology is to take a close look at the emergence as a process in time and not as a rabbit from a hat.

The principle of evolutionary simplicity

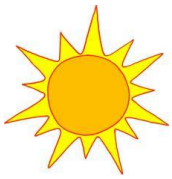
A NEW COMPLEX SYSTEM SPONTANEOUSLY EMERGES AS SIMPLE SYSTEM AND EVOLVES BY REPETITION OF SIMPLE STEPS

or, in a negative form

SPONTANEOUS EMERGENCE OF COMPLEX SYSTEMS IS IMPOSSIBLE

In the 1960's, physicists formulated the negative form as the greatest mystery of the origin of life because they could not reconcile it with physical principles. A chemist, however, would be completely comfortable with both forms. Chemically, the stepwise crawl of complexity from chemical elements to anything as mind-blowing as DNA and proteins is a piece of cake. A child with Lego can show how it is done.

Of course, the term "spontaneity" may need some hairsplitting. What is really **spontaneous** in the world? Does spontaneous mean **accidental**? Or **unplanned** by somebody's mind? Even if human mind participates in the emergence and evolution, as is the case with society, science, and technology, the principle applies: emergence and evolution of complex systems of **ideas** starts in the mind with simplicity growing into complexity by simple steps. If we do not realize the beginning of reasoning, it is there, subconscious.



As for the participation of a deity, it is not my cup of tea. Strictly speaking, nothing is quite spontaneous on earth because of the creative power of the sun and the moon. The **sun monotheism**, with the moon for a company, celebrated on the Summer Solstice with low calories pancakes on the beach, looks to me as the most rational religion for humanity. BYOC (Bring Your Own Commandments).

By system I mean what I call **exystem**: evolving complex system, see above.

The term "complexity" is the vaguest. There is no consensus on what it is, except in some narrowly defined particular cases. If so, here is my definition of **simplicity** for the case of evolution: the simple is what can emerge spontaneously. Examples: snow and sand. A snowflake may look complex or simple, it emerges in a sequence of simple steps of crystal growth, but it does not evolve. The sand, on the contrary, emerges in a sequence of simple steps of crystal disintegration.

Evolution can be understood as the continuous growth of complexity in exystems, which life on earth and human history exemplify.

If my principle is so full of circular definitions, what does it actually say? As other fundamental laws of nature, i**t states what is possible or impossible.** I am too modest to call it a law, but you, a young reader, can. The circularity means that spontaneity and complexity are fundamental ideas, like energy and time in physics: they are not reducible to something more fundamental. Stability and energy are also locked in logical circle with the concept of time: **higher energy** means **lower stability,** i.e., a **change sometimes** later.

The laws of nature, whether pattern or not, cannot be logically proved. They can only be illustrated, tested, confirmed, and sometimes disproved.

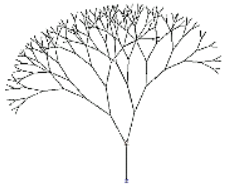


Figure 1. Snow, sand, and life

EXAMPLES. Unlike sand and snow, neither sand castles nor snow castles in **Figure 1** can emerge spontaneously. Each structure consists of the same or similar particles. They were built in a sequence of

simple steps of adding and removing sand or snow on a sand beach or a layer of snow, respectively, guided by human mind.

The polar bear on the snow did not emerge like a rabbit from a hat. Neither was it "created" like the sand castle was by a girl. Bears and girls appeared very long ago, as result of long evolution, out of something close to sand, water, and other simple substances. We believe that the original substance of life consisted of molecules of different types, while snow consists of simple H_2O and sand of simple SiO_2 molecules with some minor components. The repetition of simple steps of connecting or disconnecting two atoms is how evolution works from the point of view of a chemist. Such small acts can multiply in a branching manner, as in DNA replication or regional revolutions. Each bear, girl, smartphone, religion, and nation are links in a chain.



The repetition of simple steps of connecting and breaking bonds between some diverse entities (people, parts, bricks, semiconductors, words, ideas, spots of paint, sounds) was the mechanism of evolution of society, technology, and culture. The particular bear and girl emerged from their mothers as result of a gestation essentially similar to evolution, from small and relatively simple cells with a program of reproduction in the form of a very large molecule (DNA) similar to a long text, but, to tell the truth, rather monotonous, like the babbling of a brook.

Pattern Theory studies structural similarity of different objects of any type and origin, similarly to chemistry studying structures consisting of atoms and bonds between them.



Ideas emerge and evolve, too. Thus the idea of a deity, who created the world, evolved, too, but we do not know how because ideas leave little trace before art and writing emerge. Who can tell whether an over 20,000 year old figurine portrays goddess, woman, or a vague idea of fertility?

Yet we can explore and reconstruct the process of emergence and evolution of Roman Empire, Islam, Italy, USA, French literature, Russian Communism, General Electric, Inc., aircraft, iPAD, Tea Party, Great Recession, and the obesity epidemic, although molecules have little to do with all that, except for the last subject.

Whatever scientists think about creationists and vice versa, they seem to speak the same language:

"Using radiometric dating, one can observe that the Earth's oldest continents were **created** in geodynamic environments which were markedly different than current environments characterized by plate tectonics."

Teaching creationism to children, promoted by Tea Party is a troubling sign of social regression, obscurantism, and intellectual decline. Dragging a deity into politics is… but wait, this is a focus point of this Essay and I will come to it in due time.

4. THE BOOMERANG OF WEALTH

The main question about voting for vital interests splits into three parts:

1. WHAT ARE THE TWO ECONOMIC SPECIES? There could be some single defining difference between voters that splits them into economic classes. What is it?

2. WHAT IS VITAL INTEREST? Certainly, not the universal human needs, which are common for all, but something that is different for the two economic classes.

3. WHAT IS THERE IN VOTING MIND? What makes a person to decide which way to vote is something on his or her minds. What is it? There is a perplexing book about economic mind and it is by a Nobel Prize author.

I start with the question how many really different social groups are there if we look for patterns and not details.

Humans are different in many respects, but I am looking for largest distinctions related to vital interests in connection with voting behavior in a society where money is a universal measure of wellbeing.

I select the numerical measure taken by the government on a widest possible statistical base: money in the form of wealth and income, which are related, but not the same.

The data come from tax returns. The lowest and highest ends of the scale are incomplete and distorted because the non-filers of tax returns and super-rich filers can be for different reasons completely or partially invisible for the measuring procedure. Nevertheless, there is nothing more comprehensive—certainly not a telephone poll—than hard tax data.

The existence of the two classes is clearly visible from the statistics of income distribution in **Figure 2**. Its shape reminds the boomerang, but the wings are strikingly different in nature.

The graph shows the distribution of income among taxpayers or, to put it differently, the distribution of taxpayers by their income. It is a cumulative graph. The area under the curve equals the total income of the percentage of people. The graph shows that a few get a lot and many get a little.

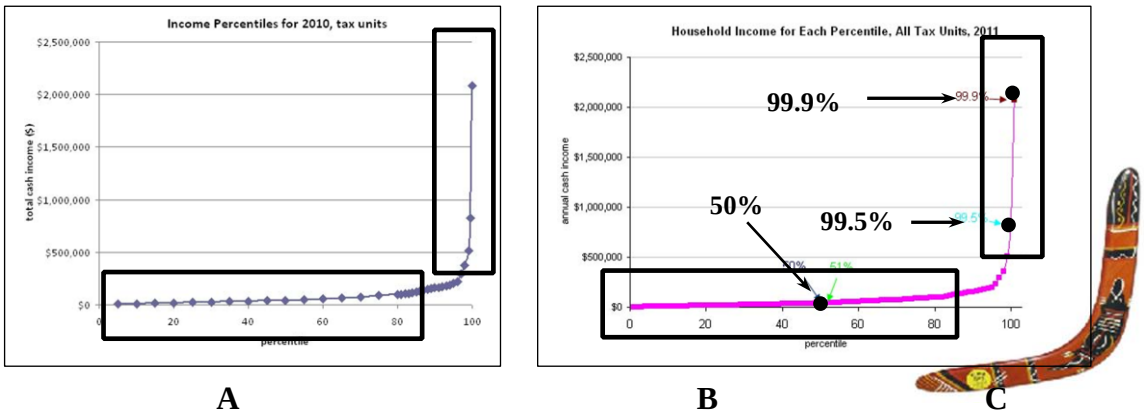
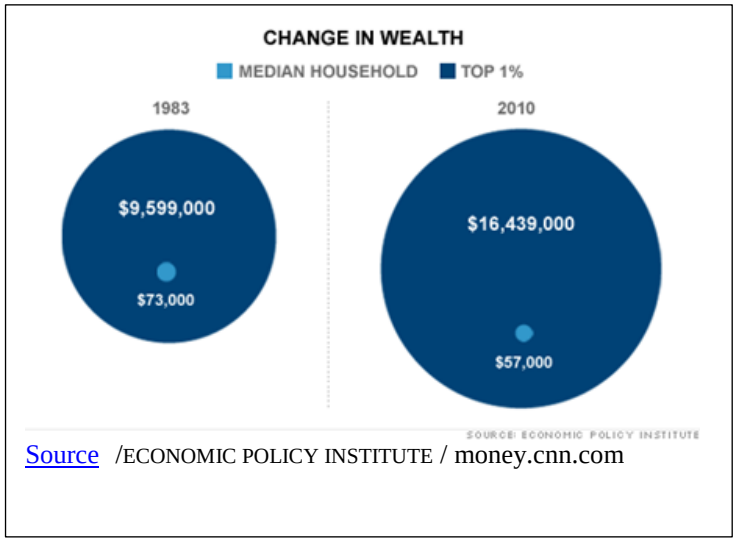


Figure 2. A: Income percentiles for 2010, tax units; **B**: Household income for each percentile. All Tax Units, 2011; **C**: Boomerang.

Wealth is not income, it is less liquid and more difficult to estimate, but the inequality of wealth is much sharper than that of income. How high is the wealth and income inequality? I quote:

The Top 1 Percent Of Americans Owns 40 Percent Of The Nation's Wealth: As Nobel Laureate Joseph Stiglitz points out, the richest 1 percent of Americans now own 40 percent of the nation's wealth.

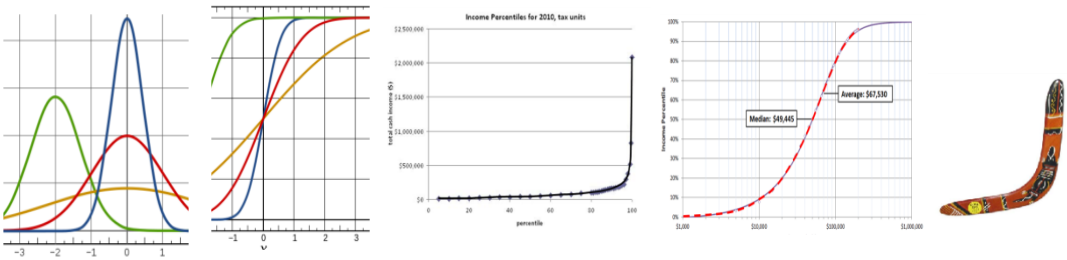


Source /ECONOMIC POLICY INSTITUTE / money.cnn.com

The Top 1 Percent Of Americans Take Home 24 Percent Of National Income: While the richest 1 percent of Americans take home almost a quarter of national income today, in 1976 they took home just 9 percent — meaning their share of the national income pool has nearly tripled in roughly three decades.

I associate the shape of the curve (known also as L-curve) with the boomerang for a reason. A society that launches the boomerang of inequality risks to be hit by its own missile. The previous boomerang had returned as a Great Depression.

To compare the **boomerang** distribution to the bell curve of normal distribution, we have to convert the **bell** (probability density) to its cumulative form, which is known as S-curve, **Figure 3D** .



A **B** **C** **D** **E**

Figure 3. A: The "bell curves," B: same in cumulative form; C: cumulative income distribution, 2010; D: same on logarithmic scale, E: boomerang

The boomerang of wealth distribution has a fascinating feature: it has no fixed upper limit, unlike any percentage. This is certainly proper for the realm of gods, not humans. Something must be wrong with the money that can endlessly grow: it is just a number, a fiction, a figment of imagination, an idea, a belief. And indeed the unlimited growth is the ultimate dogma in the religious credo of modern economy. The heretics and unbelievers—a small number—are burned at stake.

Robert Reich is among my most admired authors not just because I share or sympathize with his views, but because of the exceptional clarity of his thinking and writing. I suspect that he is a believer in simple reasons, too.

Here is how he presents the consequences of inequality in his post Labor Day 2012 and the Election of 2012: It's Inequality, Stupid of 422 words, of which I select here 188:

The 400 richest Americans now have more wealth than the bottom 150 million of us put together. In order to create jobs, businesses need customers. But the rich spend only a small fraction of what they earn. They park most of it wherever around the world they can get the highest return.

But as the middle class's share of total income continues to drop, it cannot spend as much as before. Nor can most Americans borrow as they did before the crash of 2008 — borrowing that temporarily masked their declining purchasing power. As a result, businesses are reluctant to hire.



IT IS INEQUALITY!

As wealth and income rise to the top, moreover, so does political power. The rich are able to entrench themselves by lowering their taxes, gaining special tax breaks (such as the "carried interest" loophole allowing private equity and hedge fund managers to treat their incomes as capital gains), and ensuring a steady flow of corporate welfare to their businesses (special breaks for oil and gas, big agriculture, big insurance, Big Pharma, and, of course, Wall Street).

All of this squeezes public budgets, corrupts government, and undermines our democracy. (Robert Reich)

Robert Reich describes inequality as what scientists in chemistry, geology, biology, physiology, etc., call "mechanism," meaning not a piece of hardware, but a sequence of elementary cause-effect steps. It is possible to dispute this picture. There could be alternative or supplemental

mechanisms, for example, the tendency to the risky actions justified by high concentration of wealth. Losing half wealth leaves you still very wealthy and ready to grow the lost half anew. Reasonably managed wealth does not die: it regenerates, like—here you have a metaphor, not pattern—the lost tail of a lizard.

Paul Krugman focuses on a single cause-effect link in Plutocracy, Paralysis, Perplexity **(***The New York Times*, May 3, 2012**): "…**takeover of half our political spectrum by the 0.01 percent."



IT IS POWER!

For the past century, political polarization has closely tracked income inequality, and there's every reason to believe that the relationship is causal. Specifically, money buys power, and the increasing wealth of a tiny minority has effectively bought the allegiance of one of our two major political parties, in the process destroying any prospect for cooperation.

Joseph Stiglitz lists the multiple consequences: consumption, rent-seeking, fairness, mistrust, undermining the one-person-one-vote principle, etc. His book is a real somber encyclopedia of the recent American transformation and it spares me a lot of gloomy rumination. He said what I would not dare: "1984 is upon us."

Here is his most important instability warning elsewhere:

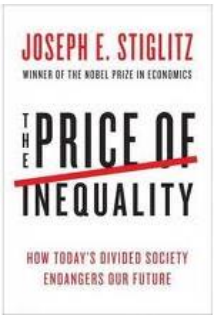


IT IS HISTORY!
1984 IS UPON US

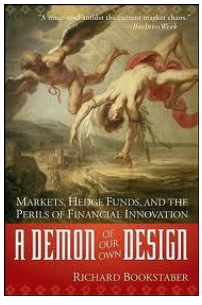
As we gaze out at the popular fervor in the streets, one question to ask ourselves is this: When will it come to America? In important ways, our own country has become like one of these distant, troubled places.

……..

The top 1 percent have the best houses, the best educations, the best doctors, and the best lifestyles, but there is one thing that money doesn't seem to have bought: an understanding that their fate is bound up with how the other 99 percent live. Throughout history, this is something that the top 1 percent eventually do learn. Too late.



There could be more mechanisms, all running in parallel, such as, for example, the blind trust in mathematical finance. The origin of catastrophic events in economy is a whole research area, all the more unreliable that they are so rare—just two in 100 years—and the conditions change dramatically from one to the other.



This is a good opportunity to explain once more the difference between pattern view of the world and—how to say it?—professional, i.e., detailed, substantiated, corroborated, and compared with alternative views. A professional view is a basis for action. We cannot build a bridge by analogy with rainbow. Pattern view is a basis for understanding a **new** phenomenon, for which there is no knowledge base. Patterns precede the professional analysis of configurations. There is little place for patterns in established areas, but this is how we make first steps in creating novelty and dealing with novelty imposed by evolution. We are still trying to understand what



IT IS FINANCIAL INNOVATION!

the computers—our own grand innovation—have brought to the world and how to deal with it. The term "**virus**" labels the pattern way to understanding. "**A demon of our own design**," the title of a book by Richard Bookstaber (*A Demon of Our Own Design: Markets, Hedge Funds, and the Perils of Financial Innovation*, John Whiley, **2007**) [**Before the Great White of 2008]** is a pattern covering configurations from the Frankenstein's monster to antibiotics resistance and, in this case, hedge funds and mathematical finance, yet another of concurrent mechanisms of the Great Recession.

The modern world is in a dense fog of complexity. I am motivated by the search for the ways of understanding new complex problems before the specialists solve them. My knowledge base is a map of knowledge rather than its full terrain and depth. I do not need to be an economist as I do not need to be a physicist or a mathematician. I need to know what the lines and colors on the map mean.



The London Whale: JPMorgan Chase's trading loss,

The instability of unequal distribution is a universal pattern: it does not depend on the nature of a system, provided the system consists of many interacting elements, whether molecules, flies, or humans, and has a sufficient degree of internal chaos.

Any inequality in distribution of energy, social energy, concentration, wealth concentration, temperature, social temperature, pressure, social pressure, political power, productivity, natural resources, etc., over space is potentially unstable.

I cannot discuss this problem in detail here. Suffice to say that this is a central idea of Pattern Theory.

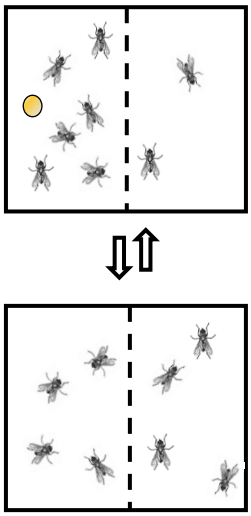
In mathematics, it is the relation between the symbols what matters, not what the symbols mean. Richard Hofstadter did not spare words to explain this in his books, especially, in *I Am a Strange Loop*. In Pattern Theory, however, it is not all: some structures, objects, relations, transformations, events, and states of the system are more probable than others, some improbable at all, and in its patter-chemical aspect, some events happen faster than others and some cannot happen at all.

I prefer illustrations to definitions. Here are some oversimplified examples of how things can be unstable and cannot stay the same for long.

1. Flies released in a room at one corner are distributed unequally over the room. With time they spread. **Flies tend to distribute equally in empty space. They concentrate around a piece of fruit. When the fruit is finished, they spread.**



2. The temperature in a room with a cup of hot water is distributed unequally. It equalizes with time: the coffee cools down, the room barely warms up.





3. A piece of paper in a room is surrounded by the atmospheric oxygen. It is chemically unstable and waits only for a spark to start burning, so that the distribution of energy in the room equalizes. Compare with financial crash.



4. The French society by the end of the eighteenth century is plagued by the inequality of wealth and, especially, power. It is only waiting for a spike in the price of bread to equalize the nation in a brutal manner.



Tunisia, 2010

5. The inequality of wealth and power in Tunisia needed only a spark to explode. And there is a spark: Mohamed Bouazizi, humiliated and impoverished, sets itself on fire. The entire region, charged with inequality, burns.

6. In 1917, the Russian society, mostly peasant, overheated by the WWI, destabilized by the **inequality of land ownership**, although making first steps toward democracy, explodes in a Bolshevik revolution and civil war. The Bolsheviks promise the redistribution of land, attract the majority, but soon after their victory take back all the land, together with industry and **all private wealth.** It takes 80 years before the absolute concentration of power begins to sluggishly relax and the inequality of wealth explodes in a privatization.

7. As for the Great Recession, **Figure 4** tells it all better than thousand words. It is not $E=mc^2$, it is ultimately simple: **inequality = instability.**

That **inequality is the main cause of instability** is an unpleasant, ideologically polarizing, and overall un-American idea, suppressed as anything setting a limit to a dream. Nevertheless, the parallel between the two Great Whatever has been widely discussed in print and in the Web.

See, for example, the Web page Great Depression VS Great Recession by ***Brian Rogel, from which I quote:***

GD: 1921 – Top capital gains tax rate drops to 12.5% *(Revenue Act of 1921)*
GR: 2003 – Top capital gains tax rate drops to 15% *(Jobs and Growth Tax Relief Reconciliation Act of 2003)*

GD: 1921 to 1928 – Average income for the top 0.01% spiked to 892 times the average income of the bottom 90%
GR: 2003 to 2006 – Average income for the top 0.01% spiked to 976 times the average income of the bottom 90%

GD: 1928 to 1933 – U.S. home values decrease by 25.9 percent
GR: 2006 to 2010 – U.S. home values decrease by 26 percent

GD: October 1929 – Stock market crash of 1929 *(Black Tuesday)*
GR: October 2008 – Stock market crash of 2008

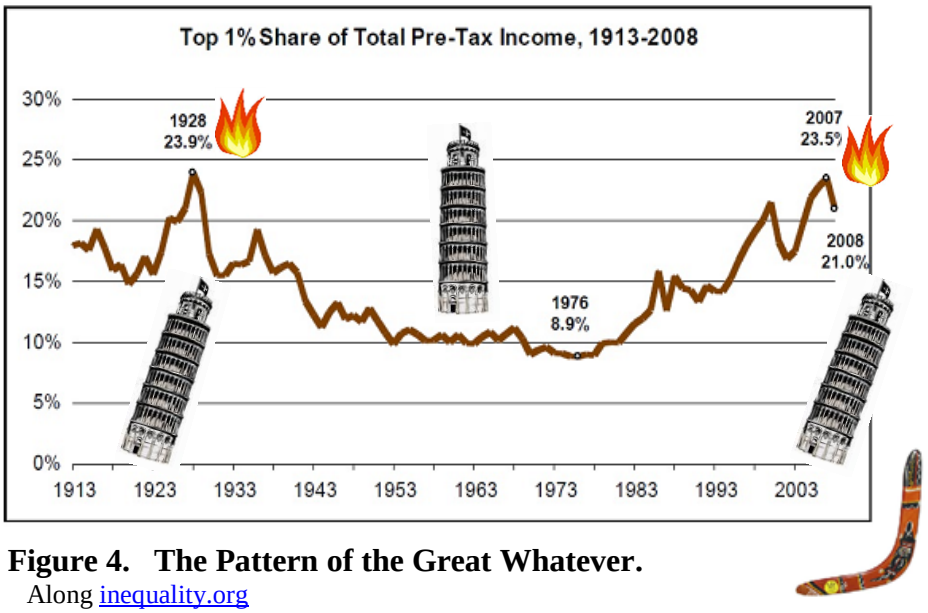
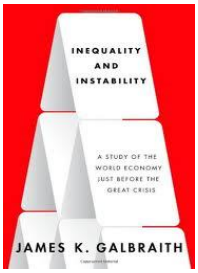


Figure 4. The Pattern of the Great Whatever.
Along inequality.org



INEQUALITY IS INSTABILITY



There are plenty of theories of the Great Depression, most of them very narrow. A large volume of work on the subject was done by James K. Galbraith, author of the recent *Inequality and Instability: A Study of the World Economy Just Before the Great Crisis* (*Oxford University Press, 2012*), a collection of his academic works on the causal link between one and the other. His more accessible interviews and publications are available on the Web. By linking two highly abstract terms, James Galbraith, I believe, is closer to pattern view than anybody else.

Rather, the deeper issue with inequality of this type ['extravagant gains by the already rich'] may be instability: that which rises like a rocket above the plain also, eventually, falls. And the problem with the trick of generating prosperity through inequality is simply that it cannot be continually repeated.

James K. Galbraith, J. Travis Hale. *The Evolution of Economic Inequality in the United States, 1969-2007. Evidence from Data on Inter-industrial Earnings and Inter-regional Incomes*. UTIP Working Paper No. 57 ,February 2, 2009. http://utip.gov.utexas.edu/papers/utip_57.pdf

Instability means to me that the system is in a state ***A*** with energy higher that another possible state ***B*** of the system: **sooner or later** it will move from ***A*** to ***B*** on its own. When it will happen can be very hard or impossible to tell, as predicting earthquakes exemplify. This can serve as a definition of energy. Instability and energy are circularly defined through each other. It gets more complicated for open systems far from equilibrium. Then the behavior depends on particular details of the system and instability may have a specific mechanism. Pattern Theory offers a way to represent specific structural details in a universal language.

I believe that all economists who offer formulate reasons for two great economic catastrophes of the last hundred years are right: the reasons sing in harmony. But the last sixty years has been the period of enormous social and technological change in the world. What is the main novelty of 2008 as compared with 1928? I believe, it is the information revolution.

One of the earliest techno-prophets of the collapse was Emanuel Derman (*My Life as a Quant*, 2004), who sensed the digital tremors long before the earthquake of 2008, but first warnings were issued by Norbert Wiener.

The computers created instability of a peculiar kind: the turbulence of a fast moving stream, like a tsunami, or Katrina hurricane, wind tunnel, or just water in the garden hose nozzle. In short, they tend to amplify (as in above examples) or conceal fluctuations, to which the world of finance was not prepared and did not care because of enormous concentration of money and resulting risk tolerance. Computers do not have facial expression and body language, which could tell humans what the flickering symbols cannot.

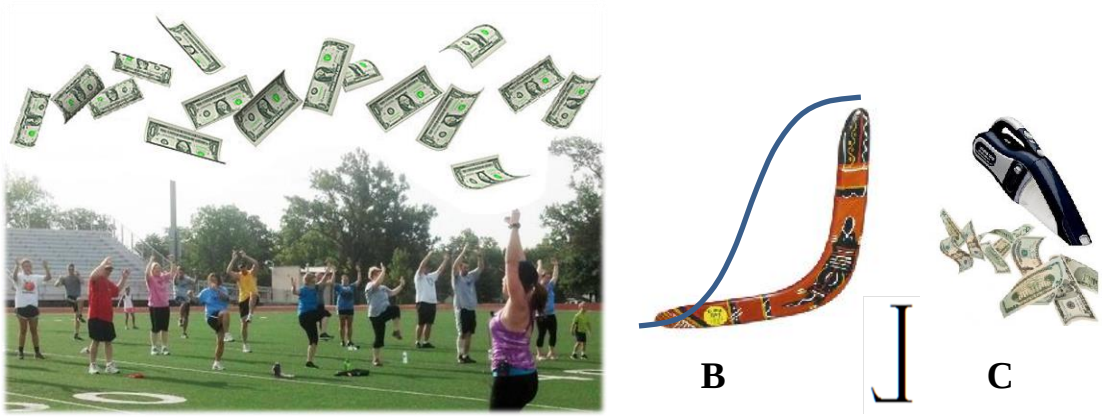


Figure 5 . Kinetic origin of wealth inequality.

Figure 5 presents my pattern vision of the technological origin of the wealth inequality.

Imagine that money is falling in dollar bills from the skies on a field with people catching and picking them up without cheating and fighting (**A**). The resulting cumulative wealth distribution would look as the blue S-curve (**B**), corresponding to normal "bell" distribution. But in reality it is the boomerang: and L-curve with the vertical "I" reaching the skies.

Imagine that **a few** people, armed with some gadget, like a vacuum cleaner (**C**), or just a broom, a butterfly net, were gathering the bills faster than **the rest.** This is what I call kinetic origin of inequality. With the amassed money the new rich could further buy more powerful vacuum cleaners. No cheating, no fight, no theft. Ultimately, they would pay (to a hedge fund) for high tech vacuum cleaners like the behemoth of **high frequency trading** facility. What the hell is it? Here is a testimony:

Vasant Dhar: So it's like a cash machine with very little risk. That's what's really appealing about it. You just make money every day. (High-speed trading goes off the Street, by Jill Barshay , Transcript . *Marketplace*, August 26, 2009



Money-Making Machines (MMM), **Figure 5**, are a branch of technology emerged around 1970. They are as diverse and vertically ranked as any kind of technology and they range from a MMM-bicycle to MMM-Lamborghini. Only the rich can afford MMMs of high productivity, such as hedge funds, private equity, high frequency trading, even the Berkshire Hathaway, originally designed for people who were not supposed to need money at all (Class A shares, $129942.00 per share). Therefore, the pool of available money generated by economy is being pumped out at incomparable speeds by the middle class and the rich. This is how the middle class was left high and dry along the shores of the money pond.

Moreover, the competition propels to the skies a very small group of super-rich. Moreover, I spitefully claim (without any facts) that it is not the super-rich who arm to the teeth the Republican revolutionaries in their onslaught on the middle class, but the simply rich who dream about the entry in the club of the super-rich. The vertical world is quite different from the planes of the middle class. There are boomerangs, L-curves, and pinnacles of its own. What we call greed is, probably, 50% envy.

Note that in this metabolism of money nobody appropriates or steals other people's money or other property. The flow of money is not even redistributed: it is simply distributed like the water in public water supply systems, where water flows only in one direction to the consumer, but the pressure and pipe diameter can vary. Or, it is like the distribution of scarce water between neighboring states and nations, which leads to water wars, whether in California or Central Asia or Bolivia.

Now we are moving from a metaphor to pattern. The parallel between money and planet's water is, probably, a true pattern and not just a superficial and single-use metaphor, but I have not yet explored it. The depths are for the professionals, not pattern chemists.

NOTE: In fact, the picture is more complex and less ill-intended because of private mutual funds and public money taken from private pockets. As I understand the idea of the tea-drunk Republicans, there must be only the single irrigation system supplying private water to swimming pools, fountains, and kitchen taps in palaces and shacks. A diluted class war is guaranteed. It would bring us to the happy times before 1929.



The "pools" of money for **the rich** and the rest are as different as the world ocean and the pond. **The rest** operate mostly within national borders while the rich dip their hands in the entire world economy. The national economy, even the largest in the world, depends on the world ocean of money **as much** as a pond in Kansas depends on the mercy of El Niño**. It is only a sea connected to the ocean in a tricky way. T**he market wisecrackers have invented a term "(n)**eurosis**" for the morbid dependence of US stock market on the events in Europe.

The technology of expensive and productive MMMs is one of the noticed but least bemoaned reasons for the apocalyptic inequality. Not accidentally, the beginning of the steady inequality rise coincides with the spread of computers since 1970 and the switch from the Gold Standard to digital money—a pure fiction until it is exchanged for something tangible and not another, larger, exorbitant fiction. Economy is the antithesis of democracy and it cannot be otherwise, unless under totalitarian socialism. One way or another, it must be regulated and this is the



Figure 5. Money-Making Machines

essence of the Cold Civil War: it is a water war.

American Family Financial Statistics **(statisticbrain.com)** Date Verified: 7.26.2012	**Data**
Average American family savings account balance	$3,800
Percent of working Americans who are not saving for retirement	40 %
Percent of American families who have no savings at all	25 %
Average American household debt	$117,951

Average American household annual income	$43,000
Average credit card debt	$2,200
Percent of American adults who do not have a bank account	7.7 %
Percent of American adults who have an emergency fund to fall back on	38 %

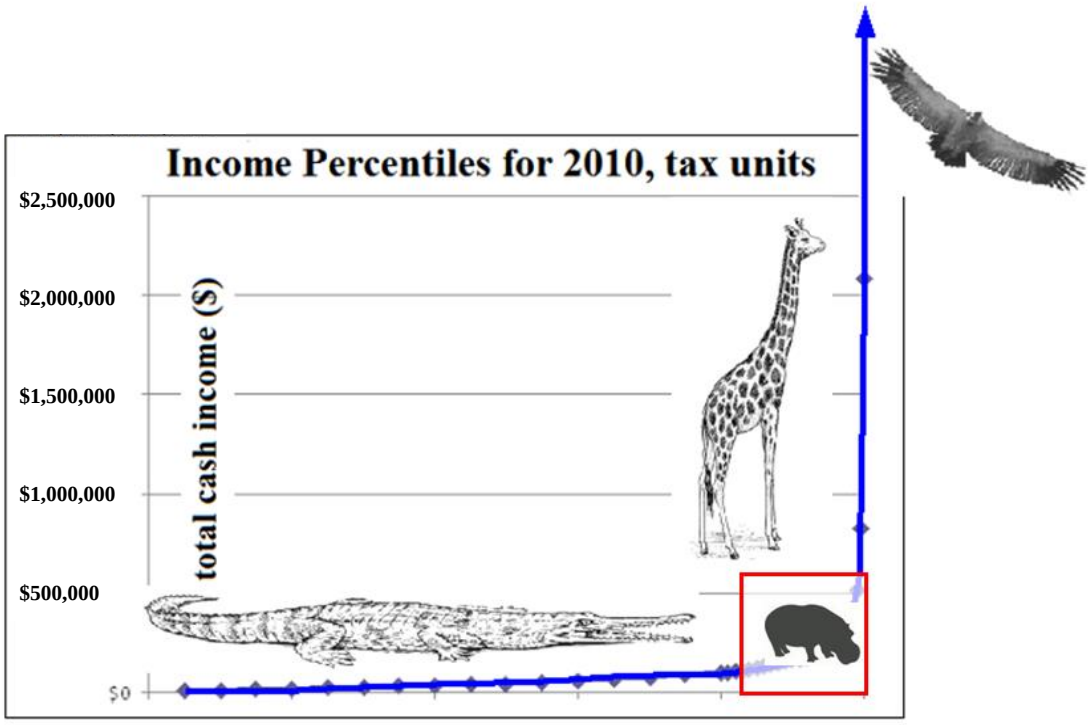


Figure 6. The bestiary of inequality

What is waiting there behind the November 2012 corner? The Robespierres of the Tea Party with the guillotine as the cure for a liberal headache? Or the specter of Karl Marx, which had never left Europe and showed up incognito, with a guitar, his bushy beard trimmed, in the American "Occupy" (instead of "expropriate") movement? Or the monstrous national debt—another instability—as an aspirin for the brain cancer of unlimited growth?



TOLD YOU SO

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There is one kind of wealth that is given away equally to all people: the

wealth of statistical data on wealth. It is available on the Web. The difference between the rich minority and the rest is so striking , that the two groups look like different socio-biological not even species, but classes, like reptilians and mammalians. **Figure 6** symbolizes the contrast. It does not show, however, how overwhelming the contrast is. Thus, one of the top personal possessions, around $50 billion, is 100,000 times larger than $500,000, the lowest "giraffe height" income. Let us take half a million figure as moderate wealth. If **Figure 6** was 1″ tall, the connecting line between the lowest "giraffe" and "condor" top would be 1.5 mile long.
How realistic is half a million? Half of American households had not more than $109,500 in 2007 and $96,000 in 2009. The average wealth was $506,500 and $390,005, respectively (source1, source2 , somewhat incoherent).

There are not too numerous books about sociobiology of crocodiles and giraffes. Reading some of them was a painful experience for me. I was left with questions with no hope to find answers.

Charles Murray. *Coming Apart: The State of White America, 1960-2010* , Crown Forum, 2012

Richard J. Herrnstein, Charles Murray. Bell Curve: Intelligence and Class Structure in American Life, Free Press 1994

Robert Frank, *Richistan: A Journey Through the American Wealth Boom and the Lives of the New Rich* ,Three Rivers Press, 2008

Robert Frank. *The High-Beta Rich: How the Manic Wealthy Will Take Us to the Next Boom, Bubble, and Bust*, Crown Business, 2011

Robert H. Frank , Philip J. Cook. *The Winner-Take-All Society: Why the Few at the Top Get So Much More Than the Rest of Us* , Free Press, 1995

Robert H. Frank. *Falling Behind: How Rising Inequality Harms the Middle Class*, University of California Press, 2007

Barbara Ehrenreich , *Nickel and Dimed: On (Not) Getting By in America* Picador, 2011

David Brooks. *Bobos In Paradise: The New Upper Class and How They Got There*, Simon & Schuster, 2001

Thomas Frank. *What's the Matter with Kansas?: How Conservatives Won the Heart of America* , Holt Paperbacks; 2005

Chrystia Freeland. *Plutocrats: The Rise of the New Global Super Rich and the Fall of everyone Else*. Penguin, 2012

Coming Apart: The State of White America (2012), by Charles Murray, is as controversial as Richard Herrnstein's and his *Bell Curve* (1994). Regardless of interpretations and controversy, *Coming Apart* is, probably, the most comprehensive opus in comparative sociobiology of crocodiles and giraffes with hippos. David Brooks' *Bobos In Paradise* takes under the social microscope a narrow segment of the hippos and lower giraffes. The brave Barbara Ehrenreich runs an experiment on herself in order to crack the mystery of survival of lower crocodiles in *Nickel and Dimed*.

Note that the hippos come not exclusively from the crocodiles but also from the baby giraffes—to get elite education and have good chance of squeezing into the giraffe elevator.

Unlike the normal distribution, given by nature and blind chance, the boomerang distribution is typical for the most significant results of human initiative and purposeful activity. It is suggestively called the **power** law distribution, or, "the more you have, the more you will have." In a straightforward form it is known as the Matthew effect (or accumulated advantage) "the rich get richer and the poor get poorer." In its extreme form it sounds like "the winner takes all." American spirit, however, does not approve of monopoly and the stars and kings of all kind rise and fall easily.

> **MONEY IS NOT WATER!** Money is not water, even though it can run as fast through the fingers. A gram or a ton of water, H_2O, whatever happens to it, does not lose an atom! Money, however, especially, if digital, is not conserved. Most remarkably, it can be created, like the world by God, out of nothing by "*fiat*," which means "let it be." I am not a mathematician, however, and I cannot clarify this problem. I can only formulate it: if money constantly changes in an unpredictable manner, what kind of physics can describe it? Can the equality signs in the math of money be reliable? Money seems to exist in time which is not Newtonian, but tangled, torn, knotted, and twisted by human factor. The truth has the same pliability.

5. A TRIBUTE TO THE RICH

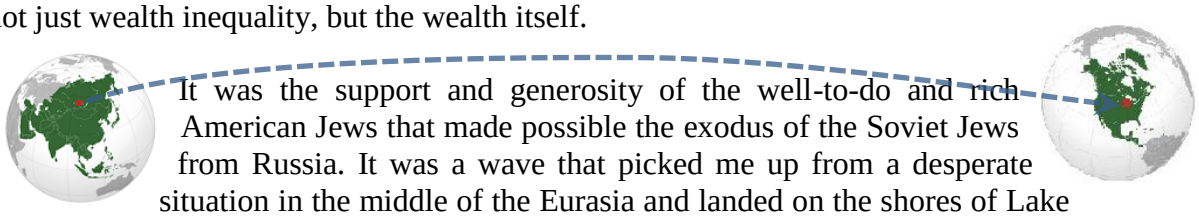
Equality is not my ideal. If I had had any illusions, my life in Soviet Russia had not spared them. True real-world equality—even the equality of opportunities—is impossible. Genuine real-world equality—and even the equality before the law—is unattainable. Money warps every playing field. Genes add wings to ankles or chains to wrists. Inequality is as natural as rain and shine. Inequality is the bright palette of life. Inequality means exciting, and stimulating diversity. Equality is for the gray army of robots good for destruction, not creation. But even the army needs generals.

> Enforced equality of wealth means, paradoxically, not democracy but monopoly of power, stagnation, and decline. Evolution means selective advantage and advantage is the synonym of inequality. In exystems—evolving complex systems consuming energy—there is a range of inequality which means stability. The physical reasons for that were discovered only around the middle of the nineteenth century and they are not so simple. Paradoxically, they follow from the physical counterpart of equal opportunities: some opportunities are lost, others amplified. Fluctuation is the physical name for "opportunity." Chemical structures that can be generated from a given set by recombination of atoms are "opportunities" in chemistry. Various thoughts in a particular mind at a given moment are "opportunities" in Pattern Theory. One of the most fundamental properties of the world is that only a small part of all "opportunities" has good chances of realization. Pattern chemistry adds to this a rider: the least obstructed opportunities are more probable. The obstruction is the irregularity of a transition state.

I am not an egalitarian. I have no moral opposition to wealth. American spirit encourages success, wealth, personal progress, and stardom, however temporary. It is the American spirit that created prosperous middle class between the Great Depression and Great Recession and remains a powerful attraction for the poor, oppressed, and mistreated, as well as for talented and ambitious. An immigrant from a despotic system, since my first day in America, I could physically feel what it meant to breathe free. I enjoy freedom, my basic needs are met, and I do not fret over missing wealth. To take what is free, to use the opportunity, to get an advantage—to condemn that is like to condemn a cat that chases a mouse.

In one way or another, willingly or under pressure, the rich contribute to all lasting things. Freedom, art, music, poetry, science, culture, philosophy, justice, information are as important to me as food and water. Throughout history it was the rich benefactors, extravagant kings, and greedy predators that left palaces, temples, and monuments for the next generations, patronized greatest artists and scientists, funded colleges, hospitals, libraries, and charities.

The rich are the keepers of freedom, diversity, independence, originality, and innovation on a very large scale because they will not give a damn for anybody's opinion. They can resist pressure. They are free to experiment and to set new patterns to the rest. The rich are the strongest potential opponents of repressive regimes. The poor can only adapt to the system or revolt. The Russian Communists were able to exterminate freedom of thought only by abolishing not just wealth inequality, but the wealth itself.



It was the support and generosity of the well-to-do and rich American Jews that made possible the exodus of the Soviet Jews from Russia. It was a wave that picked me up from a desperate situation in the middle of the Eurasia and landed on the shores of Lake Michigan.

The super-rich are often the super-generous. It is Warren Buffett who pledges: "More than 99% of my wealth will go to philanthropy during my lifetime or at death."

Or: Warren Buffett and Bill and Melinda Gates' initiative to get billionaires to pledge at least half their wealth to charity signed on 11 new families who support causes from science museums to access to marijuana.

Nevertheless, on average, the rich are not like most of us. There is an impenetrable barrier between the psychologies of the average **rich** and the average **average**. Sometimes I was jarred by a strange psychological dissonance in the mentality of the rich: they expect all people to behave as rich. I can understand that. People cannot imagine what they have never experienced. But many among the rich in America, if not the majority, are of humble or painful origin and they have enough imagination.

In any case, the rich should not have either legal or moral obligations to the rest of society. But the double entendre of the word *tribute* is intended. There is a tribute that "the rest" are paying to the rich. It is the threat of economic and political instability. The excessive inequality is a

blessing without disguise, but sooner or later, historically, the boomerang comes back as a disaster. The problem with exystems, like life, society, economy, and religion, is that they are stable within a certain range of parameters. A large deviation from the optimum ends up in extinct species, revolution, crash, and either reformation or theocracy.

Anyway, after this tribute, I swear not use the word "rich" in this Essay anymore. I do not want any ideological connotations. I prefer **the Few**. The division into the Few and the Many—the *oligoi* and *polloi*—is part of life and a law of history. It is natural. It is necessary. It happens because wealth is a life form: it multiplies like rats in a large, expanding, but still limited space. It feeds on abundant, but still limited food. In order to multiply wealth to the "condor" level, you need not only enough money left after your daily expenses, not only a passionate love of money, but also a modern rat farm, computerized, served by MIT graduates, and upgraded by a notch each year like the Apple's iPad. You need an MMM: Money Making Machine. Moreover, you need to protect your MMM with the power of the government and the courts and you are tempted to put them inside your MMM.

There are few of **the Few** because they make money faster than **the Many**. It is like a marathon or a bike race which stretches from a few leaders to the tight core and a long tail of the weak. The money road narrows with each million.



Inequality is beyond ethics because it is a fundamental pattern of life on earth, based on multiplication and competition for limited resources, from microbes to political parties and from money to fame. It is the competition in which there are always winners and losers in an always shifting order—through centuries, decades, or overnight.

No traditional Abrahamic religion either extolled wealth or saw any moral symmetry between wealth and poverty. All three commanded giving and support of the poor, as did all traditional religions and Confucianism, as far as I know. All religions assumed, however, that the commandments held only within a strictly delineated tribe, nation, religious community, denomination, or caste—and many still see it that way. Only the few last centuries shaped the liberal view of the world without borders. Yet the word "liberal" is still derogatory in parts of America. Without Middle Ages in its history, the USA as a whole is not in a hurry to embrace Enlightenment and Deism of the founding fathers. In the absence of astrophysics, Deism was a very practical substitute and still is a good metaphor and God is always a good shortcut to the reason of all mysterious things.

Religion is a complicated divisive subject and I should leave it untouched until the very end of this Essay.

Where can we see **the Many** brotherly mingling with **the Few**? Certainly not in Wal-Mart. Not on public beaches. In the polling place of the one-person-one-vote elections? It will not make any difference for the giraffes.

6. VITAL INTERESTS

I distinguish between **universal human needs** (food, shelter, security, leisure, freedom, etc.) and **vital interests** that are different for different social groups. Vital interests can clash, which is more or less the essence of history.

Placing poverty and wealth onto the same continuous scale in **Figure 6** conceals the extent of the split of the society into two biosocial classes as different as "crocodiles" and "giraffes". The Many and the Few simply have different pattern physiologies—more distinct than the difference between reptiles and mammals. The striking difference seems to be of the magnitude of the contrast between plants and animals. It manifests in the way the taxonomic class reacts to economic events: the animal can escape or fight, but the plant can only accept its fate and halt its metabolism during the drought or winter. The problem is that the next step down from "metabolic cost," i.e., the minimal level of life, is death, biological for plants and animals, social (physical in many parts of the world) for humans.

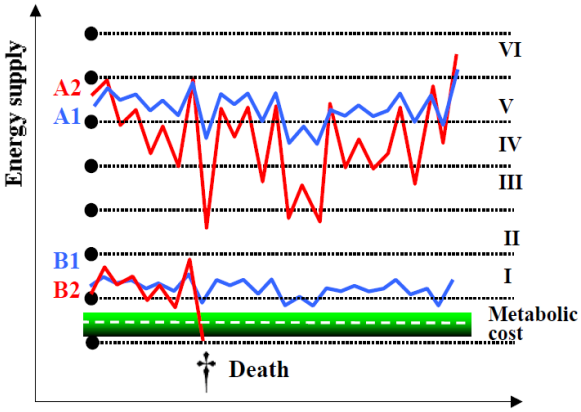


Figure 3.6.2. **Prosperity (A) and poverty (B) at low (blue) and high (red) range of economic fluctuations (temperature).**

Figure 7. Metabolic cost.
From Introduction to Pattern Chemistry, p. 101

Figure 7 reproduces *Figure 3.6.2* from Introduction to Pattern Chemistry illustrating the idea of metabolic cost.

In this Essay, I present a different visualization of the problem of two classes, inspired by the metaphor of water.

There is no Economy ocean on the map. We can imagine it, see **Figure 8**. A five-story residential beach-front property is subject to the dangers of storm surge or even tsunami from the Economy ocean.

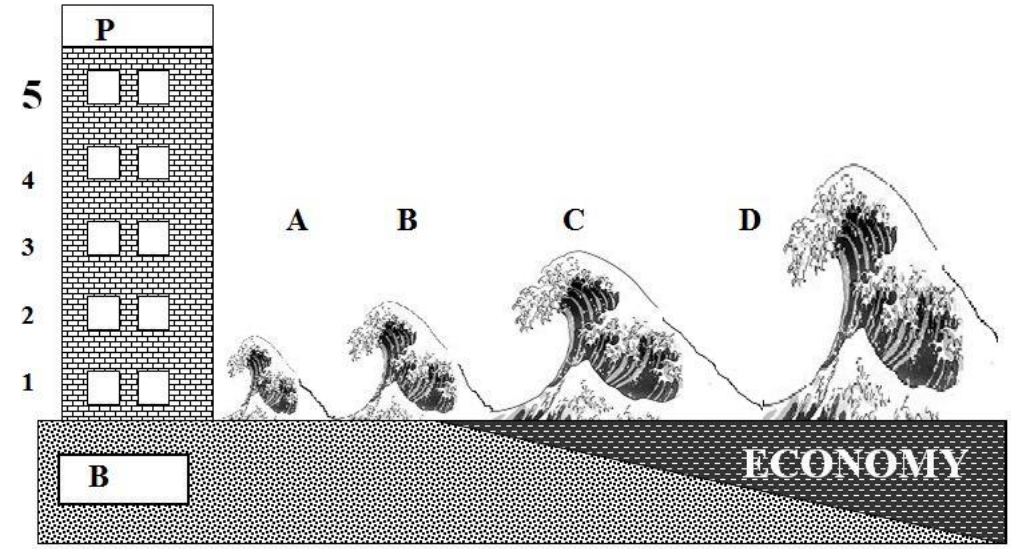


Figure 8. Inequality of loss

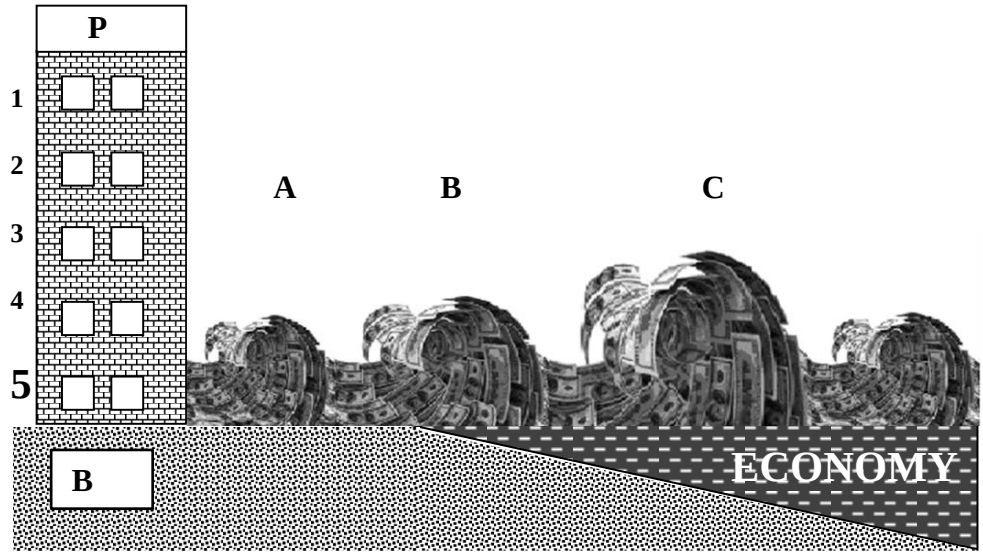


Figure 9. Inequality of gain

The irregular but limited in range tide of Economy—which the economists call "equilibrium"—does not reach the house. From time to time a storm comes and waves hit the house and bring misery and material damage to the occupants. People on the first floor are most vulnerable. People at the top may never lose anything to flood during their lifetime. This inequality of loss is matched by the inequality of gain in **Figure 9.** Both gain and loss have the same origin. The loss is just the opposite end of the scale of gain. In the long run, Economy is beneficial and

productive. It brings overall gain, although there is no law of nature guaranteeing "unlimited growth" in a very long run, just the opposite. The effect of the social structure built on the shores of Economy is such that it splits the tenants into two (not four and not three) classes. One class lives **under the threat** of moving into the basement **during lifetime**, the other class is **certain** that the basement and even the first floor are out of question **during lifetime.**

There is a limited movement in both directions simply because the number of the Few can be only, well, small. I am not sure that it is only the magnetism of multi-digit numbers that motivates some of the Many and all of the Few to elbow their way upstairs, as I do not believe that it is the loss of .07″ of thickness or a 0.5 ″ gain of screen that makes fans to swoon over the new iPhone 5. I doubt that all Americans are motivated only by money. I believe it is just the typically human diversity of talent, initiative, character, and genetic endowment, as well as the play of chance in circumstances that shapes the human fate. I do not believe in human irrationality: I believe in the diversity of reasons. But this area is still very dark even with the candles lit there by David Kahneman and other psychologists of human behavior.

Anyway, the vital interests of the Many and the Few are different: the Many want not to be flooded, while the Few want not to be the Many. As a consequence of the inequality of loss, the stakes are much higher for the Many and stability is their vital interest. But as the consequence of the inequality of gain, the Few profit not from stability, but from the storms and tsunamis of Economy. One should be rather surprised if the party of the Few called themselves conservative. One should not be surprised if the party of the Many called themselves liberal.

As for the reason for the storms and tsunami, it could be tempting to blame the Few for angering the Poseidon of Economy. I cannot blame them. It is just the inherent property of the exystem shaped by the Industrial and Digital revolutions. In this system both classes are not really two antagonistic forces, but two complementary hyper-sexes.

To summarize, there are two biosocial classes—**the Many**, open to high life-shaking loss, and **the Few**, open to high life-stabilizing absolute gain—and this is why they are represented by two political institutions. The number of parties is minimal because political Darwinism is the most ruthless of all when politics becomes a branch of economy. The parties clash not at the polling places during the elections, where everything is quiet and decent, but in the vast diverse ecosystems of human minds.

7. THE VOTER'S MIND

New ideas do not arrive to an empty mind. There is already a community of ideas, some of them friendly, some hostile, and most indifferent. The newcomer either fits in, or has to fight, or melts into shadows.



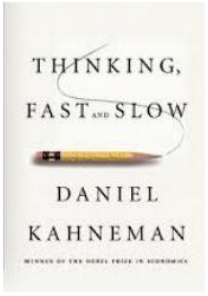
***The sleep of reason produces monsters* (Goya)**

What is there in a voter's mind? This is the to-be-or-not-to-be question for a candidate. But how can we know that? Even some presidential candidates, in bright limelight, who are expected to open their hearts, minds, and tax returns to the voters, can be more secretive than their future secret service, while others do that to their peril.



Human mind is a curtained voting booth. There is no mystery, just a secret.

Ross Carl "Rocky" Anderson , a former two-term mayor of Salt Lake City, is a fascinating but little known person (Google him). I learned about him just a few days before writing these lines, while listening to the radio. He worked with Mitt Romney on 2002 Winter Olympics in the city. In his interview to Public Radio , when asked about the presidential contender, he said that "nobody can say who Mitt Romney really is" or what he will do if elected President, so diametrically opposite his previous (moderate, pro-choice, pro-gay, pro-stem cells) and current views are.



Truly, human mind is a well-protected mystery. Nevertheless, the best minds since Plato and Aristotle to modern psychologists have been trying to crack the defenses of their own extraordinary organs.

Daniel Kahneman's *Thinking, Fast and Slow* (2011), is about the sleep of reason or, in author's terms, irrationality. I was reading it with a feeling of protest—an uncomfortable sentiment when the author is a Nobel Laureate and an excellent writer on a captivating subject of general interest. I hope to come back to this book later elsewhere [look for Essay 58]. Here I give the best known single example from a paper by Amos *Tversky* and Daniel *Kahneman* (1982).

This experiment was repeated with different people many times and the great majority (85% in the original experiment) chose answer 2, although a female bank teller is a more common occurrence than a female bank teller who is also an active feminist.

LINDA

A group of students was asked the following question:

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

Which is more probable?

1. Linda is a bank teller.
2. Linda is a bank teller and is active in the feminist movement.

The experiment and the interpretation of the statistically dominant answer as irrationality or fallacy have been criticized, sometimes in very strong words, by a part of psychologists. Psychologists remain split quite like our political parties. I am not going into details here. In essence, as I discovered going back to the history of the problem and original publications of experiments (a large, fascinating, somewhat eerie domain!), our mind, in my interpretation, works the following way.

If there are two possible answers to choose,
(the preamble and choices in an experiment often are intentionally deceptive, suggestive, or ambiguous),
the entire content of our mind—conscious and subconscious—
(it can be anything: education background, money troubles, expectation of a date with an intimate friend, weather, recent news, personality of the experimenter <yes!>, etc.)
at the time of choice divides into three parts,
(either supporting or contradicting or irrelevant, regarding each of the choices)
and it votes for either answer 1, or answer 2, or abstains in the election of the answer and votes arbitrarily.

There is much more to it in Kahneman's book and the corresponding field of psychology, for example, the division of thinking into fast and slow. I regard it controversial because what is slow or fast and rational or irrational depends on the background and education, i.e. the content of the mind. What is slow for a student is fast for the professor.

Psychological experiment in this field consists typically of filling out a questionnaire or performing an action, for example, choosing a chair from a row to sit down. As an experimental scientist used to experiments with chemicals and hardware, I was struck by a peculiar situation in psychology: the result of an experiment with the purpose to investigate the mind content of a

subject reflects also the intent, background, imagination, and **mind content** of the experimenter. This can be quite a tangle, like in a comedy of errors.

> **Just one more example**. People, it was found, tend to exaggerate risks. Thus, it is known that the risk of a fatal accident with an airplane is extremely low, but some people are still irrationally afraid of air travel. But is it irrational? I believe that it is generally natural to value your own life more than lives of strangers: the statistics that applies to others does not apply to you. Yet nobody dealing with statistics of personal risk seems to notice the cardinal difference between "my life, my health, my money" and "your life, your health, your money."
>
> Although the significance of the entire rationality research is undisputable, I do not consider interpretation of most experimental results as quite rational. This important and troubling book made me turn to original experimental works of Daniel Kahneman and Amos Tversky, as well as some of their opponents. I tried to look deeper and wider at the whole large area of behavioral psychology, which turned out not so behavioral, if playing make-believe games does not count as behavior, and not so scientific, if science means logical rigor. What it certainly is, although not on purpose, can be summarized as the theory and practice of mind manipulation. Countless and rather depressing examples can be all summarized as the principle: what you do is what is in your mind, which is a cocktail of a few ingredients, some of them secret, stored in the subconscious, and closed to yourself and the manipulator. Therefore, the manipulator uses his own mind as a template for humanity and frequently, but not always, succeeds. It is the relative concentration (i.e., intensity) of the ingredients (fears and desires) that decides the outcome. Strong fear or desire overcomes the weak fear or desire, but if there are no fears and desires to compete, there is no choice and the outcome is straightforward.
>
> The main unanswered question is: what is rational? It seems to me that because two different minds take part in a psychological experiment (or a political confrontation), what is rational for one mind can be irrational for the other. It is irrational for a college freshman to give any serious thought to an artificial and utterly irrelevant question with no personal consequences for the answer. It is irrational for a scientist to expect the same answer to an artificial question about money from a son of a billionaire and a coal miner's daughter.
>
> It has already been noted by some reviewers, that Daniel Kahneman's encyclopedia of irrationalities omits the most conspicuous item of all: religion. It is mentioned twice in passing, without judgment.
>
> But why is religion irrational as a matter of fact, not in a derogatory sense? Because for every belief there is another belief which considers the other one a fallacy. Beliefs have no consensus and ask for no proof. The purpose of religion is personal moral guidance and responsibilities, spiritual comfort, sense of community, historical roots, meaning of life, attitude to adversity, and, in some fundamentalist cases, everyday behavior and customs. It is what science based on facts and logic cannot give and does not intend to. Religion and ideology is about personal choice. But what is good for the goose is not good for the gander.

Anyway, I am coming to the core of this Essay. The voters with two different vital interests form two groups of unequal size. How can their minds be statistically equilibrated regarding the binary election choice?

Let us put the blue Democratic and the red Republican minds on a balance scale, **Figure 10**, and load the pans with items of mind content relevant for the choice.

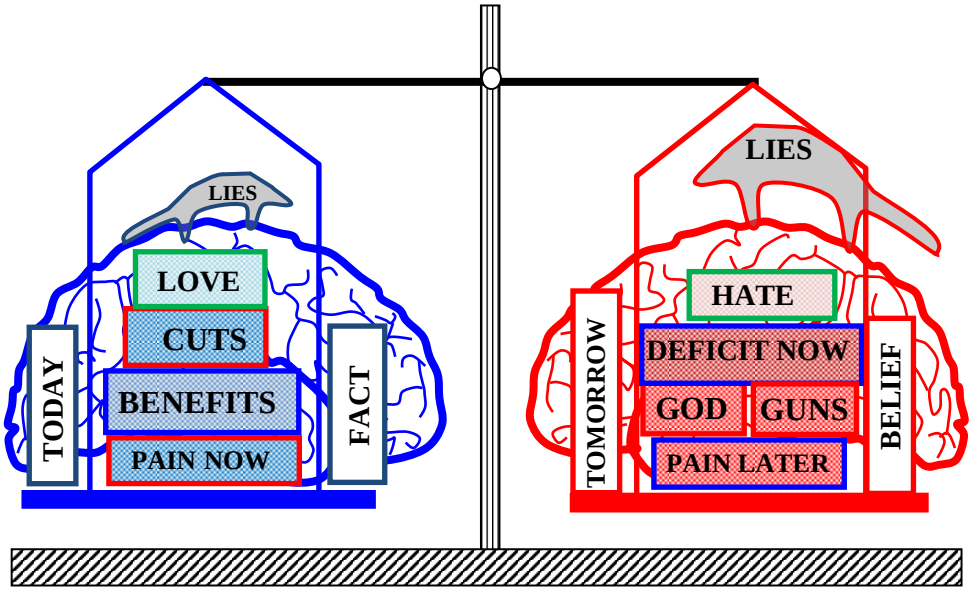


Figure 10. **The choice for the Many: Blue or Red?**

BENEFITS

CUTS

LOVE

PAIN NOW

Democrats promise and keep alive social security (literally, not just as the name of the package of programs) to the Many. I label its box as **BENEFITS**. I frame the items coming from Democrats blue and from Republicans red. The Republicans promise **CUTS**, which also add weight to the blue choice of the Many. Suppose, the person is inclined to follow the liberal and Christian idea of love of the neighbor regardless what is on the neighbor's mind, skin, or memory. Let us put **LOVE** on the scale. Since the choice depends on the state of the economy, I add **PAIN NOW** of unemployment, poverty, or uncertainty **TODAY**. If the person makes decisions basing not on beliefs and dogmas, but on **FACTS**, I mark it so.

TODAY

FACTS

Let us take a different mindset of one of the Many. **HATE** is an exaggeration, but it is certainly not **LOVE** or equal rights. It means prejudice and negative feelings to some neighbors. **DEFICIT** is a perfect reason to worry, although not for **TODAY**, but for **TOMORROW**. It is **PAIN LATER** for a concerned person who has little worries about **TODAY**. Of course, **PAIN LATER** is just an idea, but it can be painful **NOW**.

It is only my assumption that the load on the right pan can hardly outweigh the load on the left pan. The stress of the situation does not come from facts only. The right mindset is susceptible to **BELIEFS** and **TOMORROW**, i.e., the imaginary future and apocalyptic visions is a weighty

factor in the right mindset. Still, it seems to me that the it needs something else to catch up with the left pan. **GOD** and **GUNS** come to join politics of **BELIEF** and **TOMORROW**. The **GUNS** hysteria reflects the expectation that **TOMORROW** the government of the leftists will come to the doors to take people's freedoms. To **GOD** and **GUNS** I would also add the worship of **GREED** relabeled as **SUCCESS**, but it weighs upon both pans, although heavier on the right. I include it in **LIES**

The choice is ultimately between **BENEFITS** and **DEFICIT**, both **TODAY** and **TOMORROW**. My personal position, which is, by my observations, the opinion of a vast majority of voters, is that both are equally dangerous because they are two ways to name the same thing. They should be settled by a compromise in the national interests of highest priority. The party politics create national schizophrenia aggravated by money.

The choice is simple and automatics for one-issue voters. Others weigh the offers on their minds scales rigged by personal background and current problems.

Social psychiatry is not my cup of tea. I leave it here with the last note: the Few do not need **BENEFITS**, do not feel much **PAIN**, rely not on **GOD** but on money, can hire all the **GUNS** in the world, and have no reason to be much concerned about **TOMORROW**: in these hard for the Many times the MMM of the stock market is in high gear.

The Red package, therefore, is designed for the Many along the vital interests of the Few. It is like a piece of bread made of the mixture of flour and sawdust—in times of war, siege, and blockade, this is how it was often made.

And yet the Few **vote** Blue, too. I do not mean large donors. I wonder why. I have no data to substantiate my explanation, but I suspect that common sense, belief in the US Constitution, and liberal ideals are among reasons. I hope the Blue Few understand that theocracy, bigotry, limits to personal choice, depletion of reward for honest work, and exploding inequality are the guaranteed ways to destroy the USA. I believe that the Blue Few make a rational choice.

Naturally, many other compositions from the same or other blocks can be put on the balance and compared, although not so easily in numbers. Some blocks are connected, like lack of education and religious zeal, cultural isolation and guns. Professions, incomes, beliefs, and tolerances form heavy clusters, mental "molecules," which weigh more than just the sum of the isolated components.

Figure 10 is a product of my imagination. It is a configuration of a pattern of manipulated rationality. Whether it is the question which Linda is more probable (ridiculous and intentionally misleading test) or which candidate you vote for (even one with a tightly closed mind), or even whom to marry (Charles Darwin, actually, compared all pros and contras for his marriage), it is the choice between **combinations of components of different composition and weight; in other words, pure chemistry.**

I consider any religious arguments in politics irrational anywhere in the world and regarding any religion, whether in America, Israel, or Egypt. It is not irrational, however, as the last resort of

the minority—or even majority—within the democratic society, to promise a bright future instead of facts and logic. I know no major religion (or ideology, or even a TV ad for health and fitness) that would not promise something—paradise, nirvana, communism, wisdom, weight loss, or happiness the person is desperate to find.

A TRIBUTE TO IRRATIONALITY. We are taught to be rational along a universal set of rules. Rationality limits our fantasies. We are free to be irrational. Irrationality is a wealth in itself and we do not need to toil for it. It is the source of individuality and antidote to tribal boredom. Irrationality makes life a fun to live. It adds intensity, variety, entertainment, surprise, colors, taste, and humor to daily routine. It adds purpose other than money, breaks up boredom and monotony, intensifies search for gain and provides comfort at loss. Life is a theatrical play about human nature, where reason and belief, logic and passion are engaged in love, jealousy, deceit, and competition.



IT IS IRRATIONALITY!

My **Essay 57** is just a mental experiment, a game, played to illustrate the pattern view of the world and the search for similarity between the pattern-chemical composition of a new product, social structure, political situation, human mind, and stages of history.

Nevertheless, I, a registered Independent, have my own firm political convictions and I know who I am going to vote for.

Although both extremes of liberalism and clericalism are reckless and irrational in their own way and the profession of a politician does not leave anybody clean and spotless, I do not find any symmetry between Democrats the spenders and Republicans the cutters. For Democrats, Republicans are political enemies, but Republicans see Democrats as blood enemies.

It is not only the nastiness, bigotry, obscurantism, and hatefulness of the Reds that tilt my balance heavily toward the Blue. Those four attributes could be a result of my own irrationality. What important is the internal logical contradictions of the Republicans. It is the self-contradiction between the two Mitt Romneys within a short span of only ten years, from 2002 to 2012. It is the self-contradiction of two Paul Ryans: one a devout follower of the aggressively atheistic Ayn Rand and the other a devout Catholic and Tea Party hero with a gun. It is the contradiction between the Christian ideals of mercy, forgiveness, and compassion on the one hand and the social Darwinism and harsh invasive theocratic legalism in the current Republican ideology on the other hand. Moreover, it is the screeching friction between legalism and anarchism.

The most absurd idea coming from somebody whose profession is based on knowledge of history and Aristotelian logic is that we can penetrate the minds of the Founding Fathers 225 years later with a mind rejecting science, evolution, and lessons of history. How can we do that? By talking to their spirits with Ouija board? By interpreting the US Constitution as a religious text?

Of course, there is also something personal sitting very deep in my mind that makes me cringe at the Republican propaganda.

It is the same pattern of **internal contradictions** which first made me doubt the Communist ideology I was brought up in. The Soviet canon had many essential features of a religion, including sacred texts, prescribed rituals, and standards of ideological purity. It also promised a sort of paradise: the future triumph of Communism on the planet free of exploitation, inequality, and even money itself. To its credit, the Soviet system promoted education and even the universities were free. But capitalism and Western philosophy were as much an anathema as Darwin to the Christian fundamentalists.

Early in my youth I asked myself a question. The elections in the Soviet Russia were extolled by propaganda as the most free and democratic in the world. Right so. People were encouraged or even nagged to come to the polls, nobody was discriminated, there were curtained voting cabins, one person one vote, but why was there only one candidate on the ballot? That act of rational thinking was a beginning of my transformation until the open conflict much later.

The irreconcilable contradictions between Red and Blue world views mean that the USA is in an unstable transition state. The patterns of history do not promise a return to the happy days. The only thing they promise is novelty and surprise, slowly relaxing into habit. What is new for America, however, could be old for a different place on earth.

2012



Yuri Tarnopolsky

ESSAYS

Essays à la Montaigne



2001-2015

Essay 58. ALL RATIONAL MINDS ARE ALIKE; EACH IRRATIONAL MIND IS RATIONAL IN ITS OWN WAY

Pattern chemistry of rationality

Essays 1 to 56 (2001-2009) were previously published at:

http://spirospero.net/simplicity.html (contents and links to single Essays)

http://spirospero.net/essays-complete.pdf (Essays 1 to 56)

http://www.scribd.com/doc/11607864/Essays-Part-1 (Essays 1 to 20)

http://www.scribd.com/doc/12273800/Essays-Part-2 (Essays 21 to 40)

http://www.scribd.com/doc/12529842/Essays-Part-3 (Essays 41 to 56)

http://www.scribd.com/doc/17164855/Essays-a-la-Montaigne-complete (pdf, Essays 1 to 56)

Essay 57. THE FEW AND THE MANY , html (pdf)

MAIN SOURCES FOR PATTERN THEORY

Ulf Grenander, *General Pattern Theory: A Mathematical Study of Regular Structures*, Oxford University Press, 1994.

Ulf Grenander, *Elements of Pattern Theory*, The Johns Hopkins University Press, 1996.

Ulf Grenander, *A Calculus of Ideas: A Mathematical Study of Human Thought*, World Scientific Pub Co Inc , 2012.

Numerous sites on the Web.

PATTERN THEORY AND PATTERN CHEMISTRY:

Yuri Tarnopolsky, COMPLEXITY, http://spirospero.net/complexity.html

ESSAY 58. All Rational Minds are Alike; Each Irrational Mind is Rational in its Own Way

Pattern chemistry of rationality

PART ONE



While I am coming to the end of my Essays, the difference between light and heavy matter disappears. Two different sections of my website spirospero.net begin to partly converge. Starting with **Essay 57**, I place links to some new Essays into both complexity and simplicity and use pdf format.

The difference between complexity and simplicity is a matter of size. All possible states of small systems can be listed and counted within reasonable time. To list all possible states of a complex system is practically impossible because of the combinatorial explosion. For evolving complex systems (exystems) it is impractical even if possible: the list will be out of date before completion. Besides, most of the complex system does participate in an act of change. Nowhere else is this as clear as in economics: economy is the largest evolving systems on earth, gradually encroaching on life, climate, landscape, and solar system. Nowhere else was it as successfully used for creating a theory as in chemistry. Pattern chemistry generalizes chemical ideas over other areas of complexity.

Pattern Theory of Ulf Grenander, the original author of the pattern approach to human mind, inspired most of my website spirospero.net, even some poetry. Grenander's recent book is *A Calculus of Ideas*.

Patterns reduce complexity of *exystems*, (**e**volving **c**omplex **systems**) to the level of simple systems. Patterns are counterparts of physical equations for objects of non-physical nature, like ideas and social structures. We can make some abstract predictions about such systems because

patterns are limited in number and have larger life spans than details. Besides, all exystems start as simple systems and increase their complexity by simple steps. Therefore, it could be possible to explore universal patterns of change.

Chemistry is the science of structural transformation and its experience with atoms and molecules may have universal significance. After thirty years of observing, reading, and thinking, I have now much more confidence in pattern chemistry as a mode of understanding complex novelty arising daily in human evolution.



I promised in Essay 57, *The Few and the Many*, (also html) to take a close look at the peculiar area of psychology that overlaps with economy and has been presented to wide audience by one of his creators, Daniel Kahneman, in *Thinking Fast and Slow*, (Farrar, Straus and Giroux, NY, 2011). It is not odd at all that its author, a psychologist, was awarded Nobel Prize in economics (2002): today everything is economy—climate change, next iPhone, God, and Presidential Elections. Psychology and economics of rationality are just two sides of the dollar bill. The product of economy enters your life and money leaves your account through the revolving door in your mind.



The dominant part of an experiment in psychology of rationality consists of communication between the **experimenter** (sometimes, a team) and a number of participants (**subjects)**, one on one or with a group. Neuroeconomics is a different related area of research that uses brain scanning during the communication. [2]

The communication consists of speech, writing, and simple acts of behavior, like finding a chair to sit down. The verbal part can be preceded or accompanied by various visual images. For example, the subject can be "primed" to money by floating banknotes in a computer screensaver.

The fact that the psychological experiment is an interaction of two human minds seems to me of cardinal importance.





Verbal communication is uniquely human: it is the coarse backing of human life on which fate weaves its European tapestries and oriental carpets. A right person with the right words at the right time can change a human life. The peculiarity of the experiments based on verbal communication is that spoken and written phrases can be misunderstood

[2] On the surface, it looks no different than any experimental science, but the whole situation is typically make-believe, even if the money reward is real. See, for example, K. Luan Phana, Chandra Sekhar Sripadaa, Mike Angstadta, and Kevin McCabec, Reputation for reciprocity engages the brain reward center, (2010).

by both subject and experimenter. Moreover, they can be false, confusing, intentionally misleading, and emotionally suggestive.

A king or dictator does not expect a response to a decree, but their spies are watching how population reacts. A criminal interrogator needs to hear confession. A military or state security interrogator cares not so much about the words as about the hidden thoughts. Psychotherapy promises a deep mind cleanup. Social media know what is on our mind better and faster than ourselves. Language conveys and hides thought. In the digital era, our thoughts are the equivalent of gold and precious stones of the old empires and of the coal and iron ore of the Industrial Revolution. A whole industry, with Google as its flagship, is busy with mining our minds and trading the stuff, good, bad, and trashy, delivered to the surface. Our thoughts, intentions, and decisions are turned into money and we are left with viruses, scams, and disposable short-living junk, happy with ourselves, our acquisitions, and our democracy. Silicon chips mediate human communication and impose on our imagination the incontestable, commanding language of menus.

As far as personal thoughts are concerned, there are hard direct methods. Torture is the oldest, but not always reliable. Reading the mind by behavior and things under the clothes is already an accomplished technology. With no access to the mind, the airport scanner is looking for hard matter to recognize ill intent. There are a few remaining steps, if any at all, to the use of brain scan against terrorism and crime, as well as against freedom.

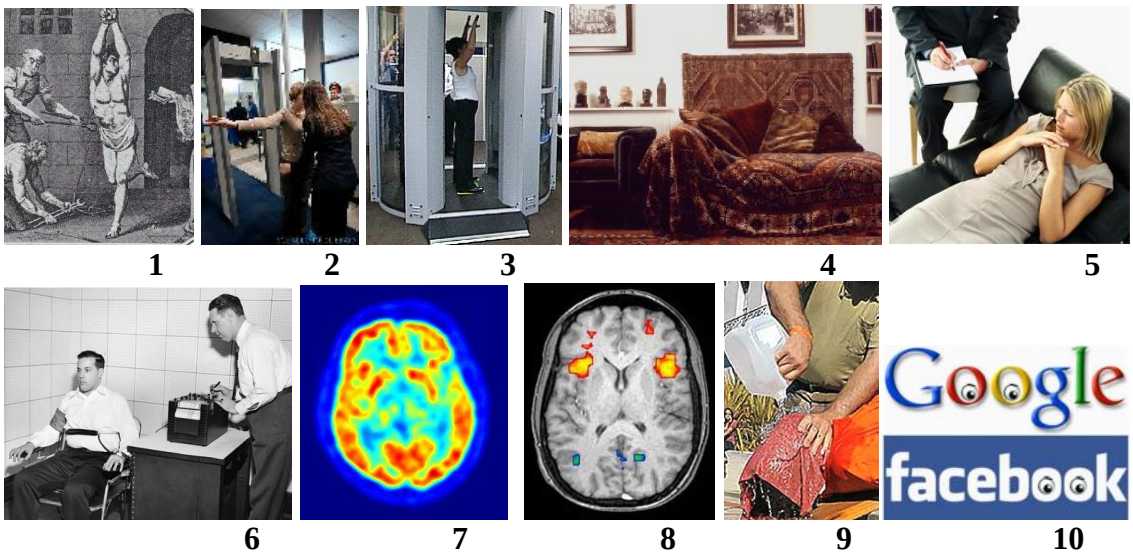


Figure 1. What's on your mind?

1. Inquisition. 2, 3. Body search. 4, 5. Sigmund Freud's original coach and modern psychoanalysis.
6. Lie detector. 7, 8. Brain imaging (PET and MRI scans). 9. Waterboarding. 10. Personal data collection.

Figure 1 illustrates some methods of crude mind reading, none of them—thank God—fully reliable or universally applicable.

Our conscious mind is a tiny part of the murky world below the surface. Mathematicians [3] describe a full lack of awareness during a major discovery. The current content of my consciousness is in the same relation to my subconscious as this computer window to the rest of the Web or my desk to the rest of the globe.

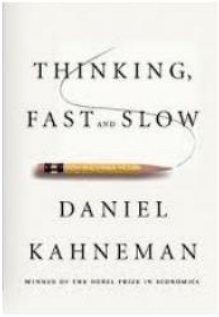
The big dark subconscious mind does not have either vocabulary or grammar of its conscious complement but it can express itself by twisting and tweaking the words already on the tip of the tong. Keen observers, from Sigmund Freud to Douglas Hofstadter, have assembled a rich collection of accidental surface splashes of the deep-water mental fish.

> Politics is the greatest aquarium to observe the depth of the mind. In the 2012 season, for example, we could enjoy watching the minds of Michelle Bachman and Rick Santorum. The two presidential candidates were transparent to the bottom because they were consistent in ideas as well as emotions and body language. But who can penetrate the mind of Mitt Romney saying mutually contradicting things over time—anything that will make you vote for him—with no expression whatsoever, except for a half-smile?

I am neither an economist, nor psychologist, nor linguist. I am lucky to be a chemist. Chemistry gives me a habit to see the world in terms of changing structure, build an inventory of combinatorial possibilities, distinguish probable from improbable, and do without numbers and equations, thinking instead in terms of MORE and LESS. In general, I cannot judge anything single on its own: I can only compare two instances. My world exists in time and space of Leibnitz. Time there does not move unless something changes and the minimal change is the unit of space.

My knowledge of the literature on other subjects is very selective and fragmentary. Thinking in patterns is my way to extract, borrow, steal, and appropriate patterns from knowledge as a whole, without borders and partitions, and in this way to compensate for the complexity of the past, urgency of the present, and the opacity of the future. I believe, together with Douglas Hofstadter, that we all think in patterns, although strikingly different ones.





Thinking, Fast and Slow by Daniel Kahneman is a captivating and engaging book. It is a rich and very artfully written accessible introduction into a vast, relatively new (although with old roots), less known (and all the more surprising) area of research of dramatic relevance for our lives and, even more, for the direction of human history. It is a book **about** how the mind works, how to manipulate it, and it is a product of human mind writing

[3] Jacques Hadamard, "*The Mathematician's Mind*," Henri Poincaré, "*Mathematical discovery*."

about (go to the previous **about**). A "strange loop" (Douglas Hofstadter) indeed.

A major part of Daniel Kahneman work was done together with Amos Tversky, who died in 1996. I will further refer to them both as K&T or Kahneman alone as the author of the recent book.

I was reading *Thinking, Fast and Slow* with feelings ranging from skepticism to disbelief to protest. It was for the first time that a long expected and highly praised book of an eminent scientist and Nobel Laureate clearly irritated me, although it fully confirmed my own pattern-chemical ideas on the subject.

For example, I could not accept the author's assessment of human mind as typically irrational in "fast" decision making and problem solving. Even the very division into fast and slow thinking looked shaky to me. Slow thinking, i.e., the thinking of an informed, motivated, educated, and professionally skilled person can be slower than a casual guess simply because it consists of a larger number of steps. On the other hand, the professional can give a correct answer to a complex question in an instant simply because of his professional background. Which atom is heavier: magnesium or manganese? A chemist will answer in an instant, not even remembering the exact densities. But a top professional, thinking day and night about a problem, can be dead wrong as well.

Kahneman's book had a catch: it analyzed the mind in terms of LESS and MORE, but judged it in terms of RIGHT and WRONG. Can we say that the leopard is RIGHT to have its spots but the panther—the same leopard under the skin—is WRONG to be all black? In human matters, the words RIGHT and WRONG are inflammatory enough, but IRRATIONAL sounds truly offensive. What pops up in my Russian mind is the Soviet treatment of dissidents in psychiatric clinics. Isn't the entire American history of civil rights, now in its war-on-women stage, the record of the shifting frontier of rationality?



If we are prone to fallacies, illusions, biases, and all kind of mental defects, then who can put the U.S.D.A. "PRIME" stamp on the mind of a psychologist of rationality?

This is all irrelevant for the purpose of this Essay, however. I use psychology of rationality as a source of factual material and it is "PRIME" enough for pattern chemistry unconcerned with details.

Daniel Kahneman's book is intended for people like me and I can understand selected original scientific papers in the area of psychology. From time to time, I will vent my emotions by the right of not only the reader but also a lab rat. Sorry, the rationality research makes me bubble quite often.



My first pattern-chemical ideas about thinking go back to 1980. Since 2003, some results can be found in complexity [4] and among the Essays. I do not repeat here all the basics of Pattern Theory and pattern chemistry. For major sources, see p.2.

I approach the problem of thinking from scratch, beginning with an experiment on myself. I am encouraged in this undertaking by the fact that I have all I need in my head to think about thinking because I do it every day, like anybody else.

Before starting this Essay, I decided, on a whim, to run my own introspective experiment. Since I have never been apt with mental calculations in general, I can consider myself general public for a psychological test with numbers. In this experiment, I am both the observer and the subject, so that misunderstanding is unlikely. I further describe it in stages as I remember it after a few days. I can guarantee only the overall logic.

EXPERIMENT

1. I ask myself: What is larger, 345 x 254 or 354 x 245? I cannot give any reason why I asked this question, but I am sure there had been something about numbers in my mind.

My choice of numbers has an explanation. I quickly select 345 as the smallest three consecutive integers over somewhat atypical 1 and 2. Then I stumble. It is not so simple to find a second **not obvious** pair. "345 x 254 or 545 x 524" is obvious.

2. The selection of the second pair requires some work. I use the first pair as a template and invert the last two digits in both factors, intuitively expecting that their influence will be minor as compared with the change in the first digit (**first guess**).

3. In less than a second, an uneducated thought goes through my mind that if we multiply a larger and a smaller numbers, the larger factor (354) will have more influence on the product (**second guess**). My fast answer is: 354 x 245 > 345 x 254.

[4] For example: (1) Molecules and Thoughts: Pattern Complexity and Evolution in Chemical Systems and the Mind; (2) The Chemistry of Semantics; (3) Pattern Chemistry of Thought and Speech and their Hypothetical Ancestor; (4) Tikki Tikki Tembo: The Chemistry of Protolanguage. See complexity for links.

4. My calculator tells me that I am wrong:

345 x 254=**87630**; **354** x 245=**86730**; **354**>345 but **86730**>**86730**. The first pair of factors gives a larger product.

5. Having discovered my mistake, I realize, with no reason, that the smaller number has more influence because its variation is multiplied by large increments of the larger number (**third guess**).

6. I have no idea where I was right or wrong. I do not know which principles a mathematician would apply, but I suspect that he would give a very fast correct answer.

My experiment leads me to initial understanding of some aspects and conditions of thinking.

OBSERVATIONS AND COMMENTS

(1) Quick thinking needs some stimulus on hand to start. It is not the **heuristic** needed for finding an answer without an explicit inference. It is **activation**, the very beginning of thinking, like the turn of the key, a coin drop into the vending machine, a military order, or the change of the traffic lights at the intersection. It can be just a question. For example, activation consists of the act of presenting a task to the cooperating subject. Normally, activation brings the mental cogwheels into motion in a very individual manner. Initiation could be a better term, but it has more connotations.

(2) Even if I used the calculator right away, it would take more time than the intuitive guess. If I was **strongly motivated**, I would do exactly that. But I was not. Nobody offered me $5 for my answer. My life did not depend on the experiment.

(3) Not only a motivated but also an **educated** subject would have better chances to give a correct answer. In the experiment, the **trial** provokes an **error**, but not a chance to learn from it, which is the most unnatural thing about ***economic*** *psychology* (one of many names of rationality research).

(4) An objective and provable criterion of success must exist in the cognitive experiment. The assumption that the **correct answer exists** is yet another knowledge-dependent component of correct fast thinking**.** As a problem can have more than one solution, the subject could find a solution of which the experimenter is unaware but should be. I characterize this condition as **completeness**.

(5) If the topic is **new** for the subject of experiment, the expectations of "rationality" should be lowered. Since the word *education* is overused, I will use the term **novelty** instead of "lack of

education." Indeed, the purpose of education is to **convey new things**. To convey known things is propaganda. The virgin experiments with novelty cannot be repeated twice with the same person, even if they are not subsequently explained.

(6) To err is not only human, it is rational. Often vague "gut feelings" and instinctive hesitation let the subject know that something is wrong with the intuitive answer and it can be quickly re-examined and reconsidered.[5] This is not the "trial and error" process because the right answer remains unknown. It looks like a signal from the subconscious, probably, of the same nature as the Freudian neurosis, i.e., unconscious conflict. It means that there is a hidden contradiction in the mind. In pattern terms, it is the instability caused by a negative bond (see further). Normally, hesitation returns the state of mind back to the beginning of the process. In chemical language, it is a reversible reaction.

(7) Since I asked myself the experimental question, there was **no misunderstanding or misarticulation of either question or answer—**an aggravation always possible between two minds, especially, because of ambiguity of language.

(8) The question of **intent, manipulation, and deceit** does not arise here, but is, in principle, possible even within one mind (cognitive dissonance, self-perception, denial).

(9) The state of mind can be MORE or LESS stable. Clarity, absence of emotional, economic, career or status-related pressure, and, ultimately, sufficient **concentration** (cognitive effort) are needed for successful solution of the problem—if the solution itself is really needed.

(10) The **background, lifestyle, and experience** of a subject are crucial. Questions about money can have drastically different pathways to the answer for a spoiled son of a … billionaire and for a coal miner's daughter. Men and women can have very different ideas of feminism.

(11) The subject brings to experiment not only his since long settled background, i.e., biography, but also the current **context**: his or her immediate problems, impressions, and most recent events, i.e., current state of flowing mind.

The problem with all experiments with verbal outcomes is that we know only what the person says but not what he thinks. Sometimes we ourselves do not know what to think or what we really want. I don't think that I am capable of reading—or speaking—my own mind during moments of stress, indecision, and passion. It is also a hard work to articulate my thoughts in these Essays and this is why I so often use pictures, quite like a caveman, and childishly prefer color.

[5] The "error detector" in the brain was first suggested by Natalia Bechtereva (or Bekhtereva) in 1968. (Bechtereva, N.P., Shemyakina, N.V., Starchenko, M.G., Danko, S.G., Medvedev, S.V., 2005. Error detection mechanisms of the brain: background and prospects. Int. J. Psychophysiol. 58, 226–234). In my scheme of things, negative bonds in the subconscious can be the source of the "error feeling." Neurosis might be the extreme case of the same phenomenon.

Motivation, the important component of an action, is always in doubt for psychological experiments. "It is a game… It is only a game."

Therefore, the following components should be taken to consideration in psychological experiments based on interaction of two minds. [6]

COMPONENTS OF EXPERIMENT	
1. ACTIVATION	6. CONCENTRATION
2. INTENT	7. ERROR HANDLING
3. UNDERSTANDING	8. KNOWLEDGE
4. COMPLETENESS	9. BACKGROUND
5. MOTIVATION	10. CONTEXT

Obviously, if a group of subjects is recruited for research, the simple percentage of "failed" subjects leaves unexplored the most precious material about individual differences of the subjects (and the experimenter!) that could **elucidate the mental mechanisms**, the much prized ultimate goal of psychology. This could be done by testing larger diverse groups of subjects and subsequent covariance analysis. It may be too invasive and difficult, but this is none of my business, anyway. No wonder, artificial intelligence is far ahead of the artificial one: we understand what we can make.

Rationality is not only defined differently for different areas of knowledge, but there is no consensus regarding what rationality means within the areas like psychology and philosophy dealing with thinking and behavior. What seems common for all known to me definitions is the need of the external arbiter of rationality. In other words, rationality is a normative notion. It is quite natural when we evaluate the rationality of a rat in a maze (is that the origin of the term ***rat****ionality*?) or a human trying to find an existing solution, like reaching a high hanging fruit. The human can surprise you, however, by inventing something never seen.



RATionality

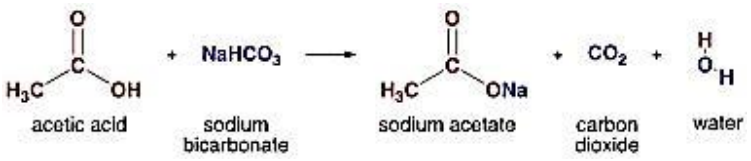
Interaction of two minds is an excellent object to illustrate pattern-chemical ideas because it is *similar* (in pattern-theoretical sense) to a chemical interaction between two molecules. The process includes observable and invisible configurations:

1. OBSERVABLES: There is the base state before the interaction (**A**), the moment of presenting the question or problem (**B**), and the final state of response (**C**). **2. INVISIBLES**: There is a transition state (**TS**) between **B** and **C** which is, actually, a short fleeting process with its own

[6] The notion of bounded rationality recognizes that up to a point.

mechanism. It happens entirely in the mind, although some changes in facial expression, posture, and, physiological parameters are possible.

If the states can be represented as **structures** with elementary ideas and bonds between them, this is all we need in pattern chemistry. And this is what I want to deal with. The strategy borrowed from chemistry consists of representing physically invisible[7] to humans **processes** in a visible symbolic language.



Indeed, a similarity is undeniable: we see bubbles and fumes in the flask, ask ourselves what they mean, what is there that we cannot see, and give an answer in letters connected with lines: a chemical equation. "Wait a minute! There are no letters in the flask!" "Right, this is what symbol means: whatever there is."

The chemist deals with inanimate matter that neither listens nor talks back. The actions of the chemist and the reactions of the **object in the flask** are measurable, recordable, and reproducible. The conditions of experiment can be varied along a continuous scale. There is no right or wrong response.

For somebody with a background in hard science, the experimental technique, typical for the rationality research, looks alien. The visible behavior is the only fogged up window into what probably happens underneath, but there is no language for describing the invisible mental process—no counterparts of atom, molecule, and bond or spring, gear, and ratchet. In short, there is **no theory**, but there is a firm distinction between right and wrong. Well, who experiments on whom? I bet I can experiment on my experimenter, driving him crazy.

When an act of behavior of a **known in advance kind**, instead of verbal reaction, is observed and registered, the subject is usually verbally **primed**, i.e. induced to think in a certain direction by injecting some ideas in his mind. In rationality research, priming can be done by various means. Pictures of money or carefully crafted semi-literary surrogates of sad or joyful confessions are supposed to tune the subject up to the topic.

> Regarding priming, there is a diminutive short story *A Horsey Name* (*Лошадиная фамилия*) by Anton Chekhov. Ivan forgets the name of an urgently needed person. The only thing he remembers is that it is related to horses. People around are suggesting dozens of horsey names, but nothing matches. Finally, when it is too late, Ivan hears the word "oats" and remembers: Oats! (*Овсов*). Ivan's helpers were definitely "over-primed." See *A Horsey Name*, a good old literary English translation by Marian Fell.

I have nothing to wonder about in the natural contact of two minds on the street, in a bar, or at a business office, where each mind has clear goals. As an experimental scientist, however, I am struck by the difference between the "hard" experiment with two reagents in the flask and the "soft" contact between two human minds in a psychology lab where the psychologist is a human

[7] Atoms and molecules were physically invisible when the foundations of chemistry have been developing.

being who asks a question and issues a verdict about another human being who neither hears it not care a bit. What is happening in the minds of both people who form a joint system for a short time?

Only a third party can decide on the rationality (if its definition exists) of both the subject and the experimenter. Obviously, this is an irrational way to evaluate rationality because a fourth arbiter would be needed to oversee the third, and so on. None of them would have an access to the mind content of the observed persons, their true goals, motivation, intent, concentration, and background. There is no universally accepted symbolic language to describe all that. There are, probably, dozens of systems of logic, each with its own notation, but logic is a totally different matter: it is detached from the content of thought and is concerned with its form. Money, love, life, success, failure, and death—it is content, not form.

Today, it seems, there is no such thing as pure psychology: it is always social in more than one sense. Here are three: (1) it takes a single mind to notice molecules and stars, while a mind needs another mind to be noticed; (2) social and educational background of both sides of an experiment do matter, see **Comments 10** and **11,** p.11, and the conclusion of this Essay; (3) like anything else, scientific community is part of economy where competition is in conflict with the drive to consensus.

In scientific practice, differences are reconciled simply by scientific community and arriving at some consensus in a mature area of research. Normative rationality, however, caused a real conflict, a Great Debate (Keith Stanovich *et al.*), a "fight" (between K&T and Gerd Gigerenzer), and even a war, as a psychologist (Helmut Jungermann) hinted by quoting the Greek philosopher: "As Heraclit[es] said, war is the father of all and the king of all." Apparently, human mind is inherently divisive both as subject and object.

> While I am writing these lines, another war for human mind is raging, see Essay 57, The Few and the Many. One can see a full display of psychological trickery in the ads and debates and the fully fanned out peacock tail of human fallacies in the reaction of the public.

The scientific community remains split on rationality instead of ditching it. I am curious whether Daniel Kahneman and his opponent Gerd Gigerenzer would find this rational. I would, cynically. If something is good, it could be sold. If something is bad, a remedy can be sold.

The best way to deal with the controversy it is to ignore the term "rationality," until it is clear what we all mean by that. Indeed, as I found out, this point of view was expressed by psychologists very early in the initial period of rationality research. Moreover, the human limitations of psychologists had been noticed even earlier.



Psychology is one of the youngest major sciences with one of the longest pedigrees. Its practice by far preceded its theory. It broke out of an egg laid by physiology only by the end of the nineteen century, curiously, influenced by chemical analogies that Wilhelm Wundt borrowed from John Stewart Mill.[8]

Am I rational? What would Daniel Kahneman say? He is merciless. Just on four pages, 161 to 164, of his book we find the following invectives:

> "Error"—"violation of logic"—"fallacy"—"misrepresentation of probability"—"absurdity"—"blatant violation of the logic of probability"—"flagrant violation of the conjunction rule" (Chapter 15, LINDA: LESS IS MORE , pp. 156-165).

The entire book is generously peppered by such or similar remarks because it is about our alleged errors and fallacies of judgment while thinking fast, although thinking slow can be no less fallacious. Besides, the entire direction of research, based on psychological experiments with groups of subjects, seems to have a major method flaw: the problems that subjects of psychological experiment had to tackle are in the absolute majority of cases totally irrelevant for the lives of the subjects and if occasionally rewards are paid, there are symbolic or just for participation. The typical experiment is a make-believe situation to which the participant had to react by telling how he or she *would* react.

Next, I am going to illustrate the reaction of the opposition.

The critique of K&T by Gerd Gigerenzer is best known, can be easily googled, and I omit it here. I need to say that I was very impressed by Gigerenzer's position and logic, as well as by his practical efforts against deceitful medical advertisement. His books are widely available.

I want to mention here two other authors.

In his classical often quoted paper, Helmut Jungerman describes "the two camps on rationality." He notes "Rationality is not a genuine term of scientific psychology but rather a concept of philosophy and economics." It requires an established norm, for example, formal logic, which has a limited area of application in psychology. I quote:

> In a somewhat exaggerated manner, I will distinguish two camps in this debate, one that points to the deficiency and one that argues for the efficiency of human judgment and decision. The

[8] The chemical influence was disputed, somewhat self-contradictory. "Further, he [Wundt] stressed that these elements [of psychological process] were to be taken as hypothetical constructs. Such elemental processes would never actually be observed, he thought, in pure isolation but would always be aspects or features of larger images or **configurations**. Here Wundt used the German word *Gebilde* [structure, **pattern**]." (Arthur L. *Blumenthal, A Reappraisal of Wilhelm Wundt*, American Psychologist, Nov. 1975, p. 1083).

> *pessimists*, as I will call the members of the first camp, claim that judgment and decision making under uncertainty often show systematic and serious errors, due to in-built characteristics of the human cognitive system. Violations of rationality, particularly of the SEU model [Subjective Expected Utility], are interpreted as true deficits of the decision maker. The *optimists* of the other camp claim that judgment and decision are highly efficient and functional even in complex situations. Observed violations of rationality axioms are interpreted as unjustified evaluations based on inappropriate theoretical assumptions or empirical approaches on the part of the researcher.[9]

Helmut Jungermann presented a detailed summary, very much in agreement with the conclusions of my introspective experiment, provided I place myself in the camp of optimists, which I do, somewhat surprised. Here are his "optimistic" points of criticism, in short: (1) most experimental situations are unrealistic, (2) there is a lack of real life context, (3) no account of cognitive effort, (4) no account of misunderstanding by subjects, and (4) no definition of what error is. He sees the arguments of the pessimists as "defensive." He does not mention the factor of the experimenter's bias, background, and intent, however.

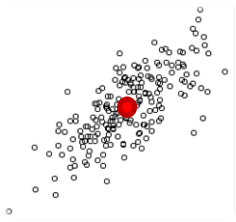
Keith Stanovich following Helmut Jungermann's analysis, labeled "optimists" as Panglossians [happy with everything as it is in the best of the worlds] and "pessimists" as Meliorists, i.e. believers in the improvement of humanity [who can sell you a good tip, I cynically comment]. The title of his large and detailed paper, with Richard West , "*Individual differences in reasoning: Implications for the rationality debate?*" (Behavioral and Brain Sciences, 2000, **23,** 645–726), reveals the direction of his thought, which I fully accept. Although not the differences I expected, they are completely to the point. The authors note:

> The so-called Great Debate about human rationality is a "high stakes controversy" because it involves nothing less than the models of human nature that underlie economics, moral philosophy, and the personal theories (folk theories) we use to understand the behavior of other humans.

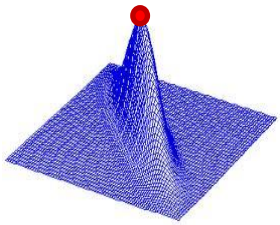
With high stakes, nobody wants to be on the wrong side in the economy of science.

The numerous ramifications of the "individual differences," however, filled me with doubt. My first impression: maybe there is a norm, but if so, we all deviate from it in various ways. My "fast thinking" solution: the norm is as normal, i.e., fictional, as the "norm" in normal multivariate distribution. The problem is, therefore, what to consider normal: an abstraction or reality. There is nothing to reconcile: one does not contradict the other. But because psychology is social, what it notices, to what it pays attention, and what it finds important changes with time and, most importantly, with economy.

[9] Jungermann, H. (1983). The two camps on rationality. In R.W. Scholz (Ed.), Decision making under uncertainty, (pp. 63-86). Amsterdam: Elsevier. Reprinted in: *Judgment and Decision Making: An Interdisciplinary Reader*, Second Edition, Cambridge University Press, 2000. A poor and incomplete copy is available. See also Google Books.



Figures on the left and right present bivariate distribution. The red dot of "norm" is just a mathematical point (the *mean*) in the space of our abilities, not our failures. I am not sure that our abilities have independent normal distributions, however.



Niels Bohr suggested that if a truth is profound, the opposite idea is also profound. As he could probably say to the two camps in cognitive science, "A Nobel on both your houses."



With the above introduction, I leave psychology—not without regret. Its exciting and challenging landscape is still hot in the process of emergence, like the islands of Hawaii. I return to the solitary confinement of pattern chemistry.

In this Essay, I quote some selected experiments in the field, neither having the knowledge of the entire area nor using them not for the purpose of criticism. I attempt to interpret borrowed facts from the position of pattern chemistry, which currently exists only in my head. Yet I am inclined to believe that in the "talking" psychology of Freudian kind, nobody in possession of such a treasure as his or her mind is a complete outsider. Interrogative psychology is under the mild curse of the "strange loop" of Douglas Hofstadter and it is even stranger: it is a double loop.



PART TWO



PATTERN CHEMISTRY FRAMEWORK

I start with the question coming from Douglas Hofstadter and David Moser (*To Err is Human; to Study error-Making is Cognitive Science, Michigan Quarterly Review* Vol. XXVIII, No. 2, Spring 1989, p.191)

> What do cows drink?

The authors predict that "almost everybody finds that the answer "milk" jumps to mind virtually instantaneously, even though it is clearly wrong."

> For anyone in our culture, the concepts "cow" and "drink" are both neighbors of the concept "milk", and since each of them has been activated by the question itself, some activation from each spreads to the concept "milk." (Hofstadter and Moser)

Here is my introspective report, stage by stage, about how I reacted to the "cow" question.

1. INITIAL STATE. The moment I saw it (almost half a year ago), the question triggered the **initial state** of a process in my mind. No doubt, the idea or image of milk popped up in my mind in an instant, without thinking. I was ready to answer "milk", but hesitated half way.

2. TRANSITION STATE. Transition state was short, ephemeral, and impossible to either clearly keep in mind, or describe, or repeat. The **transition state** barrier from the initial state to the **final state**, i.e., answer MILK, is very low. The elementary ideas COW and DRINK bring up MILK from the composite idea DRINK—COWS—MILK.

3. INTERMEDIATE STATE. My **final state** "milk" **was not stable** enough and I hesitated: something was wrong with it. It took some short time, but longer than the way to almost saying "milk" in the beginning. I have reached an **intermediate state**—of doubt, hesitation, and

instability —which was more **stable** than the **transition state** but not stable enough to be the **final one**. Note that I am doing without numbers, satisfied with MORE and LESS.

4. SECOND TRANSITION STATE .Through the **second transition state**, on the way to "water," another word/idea popped up: GRASS. With hindsight, I can hypothesize why "grass" was part of the transition state. When we see a cow, it is more often with grass, not water. Again, whatever I had in my mind was unstable. Subjectively, the instability of a mental transition state is often accompanied with a slight discomfort and feeling that something is wrong: a micro-neurosis, I would say. [10]

5. FINAL STATE. I reach the **final stable state** "water." I feel relief.
While finishing the above report almost half a year after running the "cow" experiment on myself, I suddenly realized that cows, indeed, drink milk: as calves. This is an example of the **incompleteness** of the experiment, which I noted in **OBSERVATIONS AND COMMENTS:** there is more than one solution. What is peculiar about this minor flaw, both the experimenter and the subject can defend with equal strength their positions of unequal imagination. I believe this is one of the key "individual differences" issue of the Meliorist-Panglossian divide: both sides in an experiment are humans with naturally different capacity of imagination, as well as all other abilities, in line with Keith Stanovich' ideas. I am inclined to view imagination as the ability to analyze the situation, split it into components (generators), and find all their relevant, i.e., most probable combinations (configurations) and similarity relations between them.

> Groups of similarity transformations define patterns. This is the essence of the method in Pattern Theory. Interestingly, analysis and synthesis in Pattern Theory need the participation of **individual** human mind. It cannot be fully algorithmic. This is why I see Pattern Theory of Ulf Grenander as the theory of human or artificial mind and not of the world around, which is the subject of specific sciences.

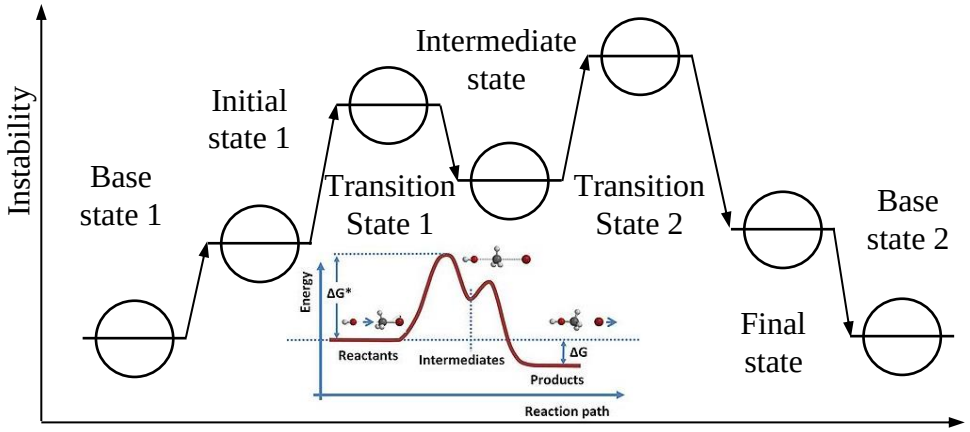


Figure 2. Stability change in a cognitive act with intermediate state. Inset: same for a chemical reaction.

[10] While writing this Essay, I felt full of respect for Freud.

As we cannot perceive transition states **in either chemistry or cognition**, we have to imagine them and then select a few most stable ones. Moreover, we have to imagine the most stable final states. Since all configurations are combinations, this process can be algorithmic, at least partially. Imagination is the core of intellectual power, although it alone does not guarantee the power of achievement. The latter consists in increasing the stability of transition states leading to the goal and decreasing the stability of those leading away from it. Ultimately, it amounts to imagination, too. In daily life we speak about foresight, leaving imagination to fiction writers and poets. I am not familiar with IQ tests, but I wonder if they test imagination.

From state **1** to state **5**, the content of the cow problem sits in my mind sticking its head into the conscious with most of the body in the subconscious mire. Before the initial activation[11] and after the relief of the final state, the mind is in the **base state** concerning the cow, which means that it is out of my conscious mind and a new cognitive event can begin.
Figure 2 illustrates the change of instability along the pathway of a cognitive event. I inserted there a small illustration from a chemical text. The exact appearance of the connecting line, as well as the time line, in both cases is unknown. Transition states, by definition, cannot be isolated.



Figure 3. Elementary and composite ideas related to COW.

In order to complete the pattern-chemical picture, we need to reveal the structure behind the states: the generators.

Figure 3 represents some simple and composite ideas pictorially, verbally, and pattern-chemically. In terms of Pattern Theory, elementary ideas are **generators**, some of which are connected, producing **configurations**, i.e., **composite ideas**. This looks like atoms connected by bonds into molecules. The latter are material objects that can be observed through a special microscope.

The cardinal novelty of Pattern Theory is the formalization of the long known representation of thoughts as skeletal structures consisting of points and lines. It consists of attribution of probability to both generators and connecting bonds.

[11] I use the word "activation" not in the sense of spreading neurophysiological excitation, but closer to its meaning in chemistry: activation, for example, by collision or radiation, brings the system into state ready to a possible transformation. Transition state is a process and activation is it very beginning, like an accidental meeting that initiates a relationship. With molecules, it is not just sufficient energy, but also a particular position.

There could be some issues with the meaning of probability for mental constructs and convertibility of probability to **energy** or its doppelganger **instability.** Nevertheless, this approach offers us a firm pattern-chemical ground, all the more attractive that we do not need to know any neurophysiological details and lose any ground for fight about inherently non-consensual matters[12].

Generators and bonds are just words of the language in which we can describe what we see going on between two minds as if it were happening between two magnets, or two mice in a cage, or two protagonists in a silent movie. For as long as the language helps understand a mystery, does not create a new one, and causes defection of the opponents, we can trust it.
The bond has the following meaning: the stability of two generators connected with a positive bond is higher (or energy is lower) than the stability of isolated generators. Negative bonds mean that two generators require energy to be connected because they repel each other and are more stable apart. The negative chemical bonds (antibonding) are as real as positive bonds. Just almost nobody is interested in them because of their instability. But, as I believe, they are absolutely crucial in a cognitive act because they signal that something is wrong, creating a vague mental discomfort. Compare with chemistry:

> Another particular feature of antibonding is that the *antibonding orbital is more antibonding than the bonding orbital is bonding*. (source)

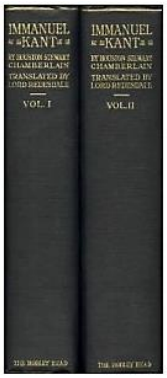
The previous paragraphs omit significant and sometimes unresolved issues with this picture, but I cannot repeat all that here. Instead, I refer the curious to Introduction to Pattern Chemistry and the rest of complexity, where much more can be found about pattern chemistry of thinking and its verbal expression.
Next, let us take our cow by the horns. **Figure 3** shows what can happen when the mind is activated by cow-related pictures. In order not to get mired in terminology, definitions, and formalism, I will discuss **Figure 3** free-style.

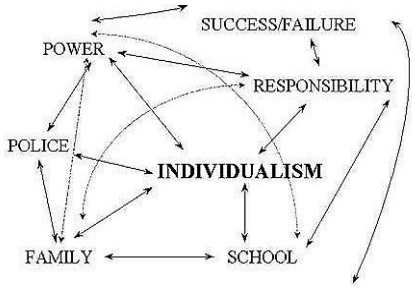
The top row of **Figure 3** contains generators (elementary ideas) COW, MILK, WATER and DRINK. Each of the ideas has one of many possible pictorial presentations. A picture or words under it activate other bonded pictures or ideas—one or more, simple or composite.
The pictures in the bottom row are selected configurations. They are relatively stable small "molecules" of thought that pop up from the mind content and disperse after the cognitive event ends.

Mind is a pattern-chemical flask with content disturbed and agitated by external events and internal spontaneous fermentation.

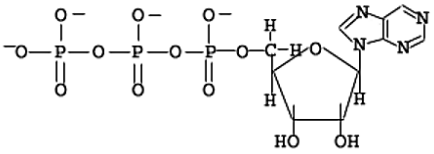
[12] Why is it possible to reach consensus in physics or physiology, but chronically impossible in economics, psychology, politics, and other human matters? (1) Scholars in human matters are humans; (2) they study humans; (3) humans are combative because life is competition; (4) competition means taking sides in a contest in order to win and get an advantage. Competition without a rival is meaningless and if there is no rival, it should be invented. In terms of **Essay 57**, for a crocodile to set foot among giraffes requires trampling some crocodiles.

The relation between mind and reality has been subject of countless heavy volumes and we will get lost in just these two terms set side by side. Mind is real and reality is in the mind and it is better not to start another rationality war. Most of what I am going to say in this segment has been known for a long time and in many versions.





Everybody can invent a new way to express one of the oldest psychological concepts: associations, the crisscross links between components of mind and reality. All of them will have topology of graphs: points connected with lines, quite like molecules.



Chemists had been able to analyze and predict chemical transformations with molecules before atom became a household name and molecules could be observed. In 1905, Albert Einstein was motivated by desire to prove reality of atoms in his work on Brownian motion. We still do not know what a thought, idea, and mind content *really* are, not to mention what "really" means but we can understand how they behave. Jumping from molecules to words, it is the same way we understand the meaning of a word defined through other words in a dictionary.[13] But the notion of "individualism," for example, will be divisive in one way or another because notions are individually grown in our minds on the soil of our life experience and are as diverse as American winter squash.



As an exercise, one can try to list all associations with any picture in **Figure 3** in the bottom row within half a minute, play the Word Association game, or travel in a time machine 100 years back and listen to the lectures of Carl Jung on his association method. I also recommend the movie A Dangerous Method (David Croneberg, 2011), which seems to confirm the disrationality concept of Keith Stanovich.

Next, consider what can happen in the mind activated by "what" in the question "What do the cows drink?" DRINK can activate WATER and MILK, as well as TEA, COFFEE, WINE, BEER, MEDICINE, POISON, etc. What in fact will be activated, as I suspect, is the most probable/stable generators in the Jungian personal subconscious.

> More probable generator is more stable in the sense that it is more probable to be in the conscious sphere, continuously or flickering, i.e., it has higher time frequency.

I can think about coffee in the morning, my medicine after meal, a glass of wine at dinner, and, probably, poison, if I am plotting murder, before falling asleep. In conjunction with COW, only

[13] **EXAMPLES (**from Merriam-Webster): **hasband:** an ex-husband; **derecho:** a large and long-lasting wind storm that is associated with a band of rapidly moving thunderstorms; **webster :** a person who frequently uses the World Wide Web; **bankster :** a member of the banking or financial industry who engages in reckless or predatory financial practices.

WATER seems most probable. COW is an animal, and animals DRINK WATER. Other liquids, from TEA to COFFEE, would make the thought very unstable because of the negative bond, not just a lack of bond, with COW. They do not behoove there. COW, however, is *usually* associated with MILK, not in all contexts, but at least for somebody unrelated to farming. MILK behooves the COW.

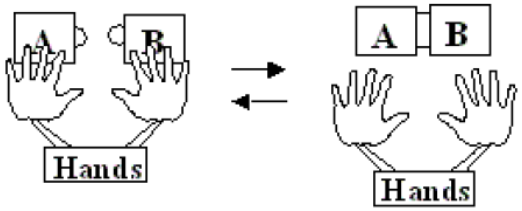
Why do I use here the rarely used verb "behoove" for the first time in my life? Ten days ago I was watching Saudi Prince Turki al-Faisal using this word on his interview with Charlie Rose. I knew its meaning but it seemed so unusual that the word stuck in my mind. BEHOOVE has nothing to do with hooves. **BEHOOVE BEHOOVE**s the **COW** because of its **HOOVES**. Two positive bonds between three generators, of which BEHOOVE is just a sound, makes the triad stable enough in the current context because BEHOOVE is still "fresh in my memory," as we say. FRESH has strong links to STABLE, pulling MILK into the triangle. Writing the beginning of this sentence I almost heard the HOOVES of a HORSE coming out its STABLE. In my mind, COW transmuted into HORSE.



HOOVES

What I think right now depends on the most stable (probable) part of the current content of my mind. It is a layered cake: upper crust changes by the minute and lower levels renew day by day.

Triplet **A—C—B** takes a special place in chemistry and pattern chemistry. The enormously important in chemistry and biochemistry catalysis has a general mechanism **A + C + B → A—C—B → A—B + C**, where C is catalyst. It is not incorporated into any stable structure in this transformation. Formally, nothing happens to C regarding the initial and final states. It can repeatedly perform its catalytic function. All it does is to make the transformation of **A + B** into **A—B** more probable in time, i.e., faster. In chemistry, it makes both direct **A + B → A—B** and reversed **A—B → A + B** transformations faster.



There is a lot of popular stuff on catalysis on the Web. From pattern-chemical perspective, see *The Visible Hands: Homo Faber and the Chemistry of History* in complexity **.** I reproduce its representative picture here.

In a linear triplet **A—C—B** both **A** and **B** are in the topological neighborhood of **C**, which increases the probability of bond between **A** and **B**.



Similarly[14], **in Figure 3**, MILK bonded with DRINK and COW (blue lines), increases the bond strength between DRINK and COW. I show the "second-rate" bond with amber line. Conversely, DRINK and COW, if activated close in time, activate MILK, if there is nothing to compete with this course of cognitive event.



[14] Similarity is the magic word of Pattern Theory. Analogy has a bad reputation: there are good, bad, and false analogies, but similarity, unlike analogy, is well defined. It is the only alternative to reductionism way to see the world as a whole.

I expect, however, that the same question asked close in time or space with the picture of a COW near WATER, would leave very little stability to MILK. Similarly, not just the calf drinking milk, **Figure 3**, but also the picture of a cow and calf near water should increase the probability of MILK as answer. In rationality research, the priming by text, speech, and image is typical. Anyway, those are my predictions. Such experiments cannot be run introspectively and I have to wait until somebody experimentally recombines an individual human mind with the brighter aspects of cow's life and see what happens.

The magic properties of a triangle have been noted in psychology and social psychology of small groups. This is a big topic, with which I am only superficially familiar. It straddles graph theory, topology, sociology, and cognitive psychology.

In graph theory and image recognition, full graph is a graph in which all nodes (points) are connected with each other. Single bond and triangle are the smallest full graphs. Four-node graphs can have some possible bonds missing. In a triangle, to use the language of topology, all points are in the neighborhood of each other. What I call triplet, however, is different: B—A—C is a linear configuration, in which B and C are not connected.

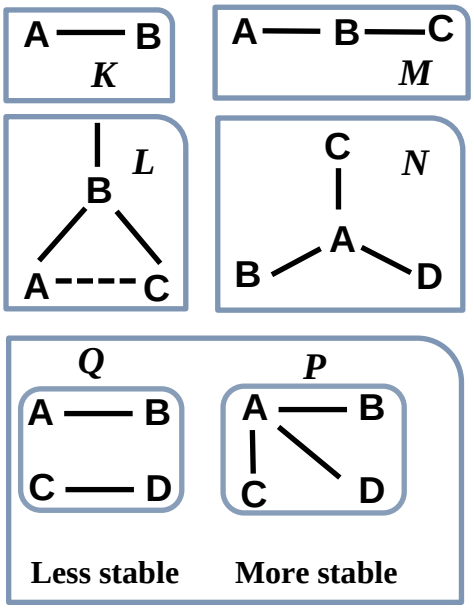


Figure 4. Configurations of simple thoughts

I suggested (see *Pattern Chemistry of Thought and Speech and their Hypothetical Ancestor* or this) that the difference between thought and language is that former is non-linear, containing such fragments of the network of ideas as triangles and forks (reducible to triangles), speech is always linear, consisting of doublets and triplets. Therefore, a thought on its way to speech must undergo linearization. This is possible in more than one way, causing the divergence of languages at the earliest stage of their evolutions.

Figure 4 shows some of the simplest possible thoughts. Configurations ***M*** to ***P*** are superpositions of bonds of **A—B** type (***K***) between just two generators.

In triplet ***M*** and configuration ***L*** , the central **B** has the peripheral **A** and **C** in its topological neighborhood. This makes them, so to speak, "neighbors of the second degree." If **B** is activated, both **A** and **B** are activated, too, which makes them similar to the doublet ***K***, although the strength of the bond **A- - -C** depends on the properties of the bonds **B—A** and **B—C**. This **triangle** configuration is unique in the sense that its three generators are always in the neighborhood of each other, although the probability distribution of the three bonds can vary. This is what catalysis means in chemistry, but it also naturally applies to pattern chemistry of the mind and its branched network of associations.

The concept of triangle found a place in social psychology long ago.

The theory of balance in social psychology is just another embodiment of the concept of pattern-chemical stability.

Georg Simmel had powerful encyclopedic imagination, which generated numerous and still underappreciated ideas in philosophy, economics, psychology, and humanities in general. I was greatly impressed by his *The Philosophy of Money* (1907), which also included psychological aspects.

I quote here an overview of an early idea with a pattern-chemical spirit.

> [Georg] Simmel, writing at the very start of the 20th century, had a different view of the role of relationships in social settings. He began by noting that the dyad, the fundamental unit of analysis for anyone studying relationships, including social networkers, was not the best focus for understanding social behavior. Indeed, he argued that before making any predictions about how two people in a relationship might behave, it is important to understand their context. The context, Simmel continues, is determined by the set of third others who also engage in various relationships with the two focal parties. In other words, Simmel argued that the triad, not the dyad, is the fundamental social unit that needs to be studied.
>
> David Krackhardt and Mark S. Handcock, Heider vs. Simmel: Emergent Features in Dynamic Structures.

In sociology, a third member added to the diad destabilizes the group. In pattern chemistry, the third generator increases stability.

As for context in relation to "irrationality", Richards Heuer brings Panglossians and Meliorists together, in a curious way, separated only by a one way mirror:

> To see the options faced by foreign leaders as these leaders see them, one must understand their values and assumptions and even their misperceptions and misunderstandings. Without such insight, interpreting foreign leaders' decisions or forecasting future decisions is often nothing more than partially informed speculation. Too frequently, foreign behavior appears "irrational" or "not in their own best interest." Such conclusions often indicate analysts have projected American values and conceptual frameworks onto the foreign leaders and societies, rather than understanding the logic of the situation as it appears to them.
>
> Richards J. Heuer, Jr, *Psychology of Intelligence Analysis*, CIA, 1999

In other words, Panglossians can, actually, improve the world, while Meliorists—at least in foreign affairs—can destabilize it. I believe this is what is happening in Iraq, Afghanistan, and Middle East in general.

The Panglossians here are, actually, in the role of Meliorists. The deep roots of the Meliorist mindset were uncovered long ago:

> The **psychologist's fallacy** is a fallacy that occurs when an observer presupposes the objectivity of their own perspective when analyzing a behavioral event. The fallacy was named by William James in the 19th century. It is a specific form of the "similar to me" stereotype: what is unknown about another person is assumed, for simplicity, using things the observer knows about themselves. (Source)

This means that the Meliorists are, actually, Panglossians: optimists who think about the world and themselves better than both deserve. They believe that world can be improved and only they know how.

What makes any mindset unstable, indefensible, and ultimately militant is internal contradictions, logical as well as factual (see the end of Essay 57). They are destabilized by negative bonds between ideas that repel each other.[15] Political and religious beliefs easily implant themselves in minds sparsely populated with ideas where nothing opposes them.

Speaking about psychologist's fallacies, more than one might apply:

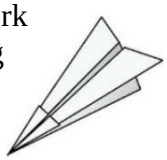
- Curse of knowledge – when knowledge of a topic diminishes one's ability to think about it from a less-informed perspective.
- Bias blind spot – the tendency to see oneself as less biased than other people, or to be able to identify more cognitive biases in others than in oneself.
- Confirmation bias – the tendency to search for or interpret information in a way that confirms one's preconceptions.
- Congruence bias – the tendency to test hypotheses exclusively through direct testing, in contrast to tests of possible alternative hypotheses.
- Denomination effect – the tendency to spend more money when it is denominated in small amounts (e.g. coins) rather than large amounts (e.g. bills).
- Experimenter's **or** Expectation bias – the tendency for experimenters to believe, certify, and publish data that agree with their expectations for the outcome of an experiment, and to disbelieve, discard, or downgrade the corresponding weightings for data that appear to conflict with those expectations.
- Ludic fallacy - the misuse of games to model real-life situations.
- Negativity bias – the tendency to pay more attention and give more weight to negative than positive experiences or other kinds of information.
- Projection bias – the tendency to unconsciously assume that others (or one's future selves) share one's current emotional states, thoughts and values. (from Wikipedia)

[15] How can bonds be still called bonds if they mean repulsion? Because the generators in the mind are bound to remain close. They have no freedom of movement for the lack of Euclidean space.



LINDA

LINDA is the classical case from the very large body of early experimental work started by K&T. Having stirred up a lot of criticism, it remains the largest stumbling block of rationed rationalism. I am not going to throw another pebble at LINDA. She is already 40 years. I am not a psychologist. It is too late. Consider it a paper plane.



I am interested in pattern-chemical mechanisms, i.e., the sequences of elementary steps, in the mind of the first people to whom LINDA was first introduced.

In a series of psychological experiments the authors asked "a group of 88 undergraduates at UBC [University of British Columbia]" to rank the following statements by, I quote, "the degree to which Bill[16] (Linda) resembles the typical member of this class:"

Linda is a teacher in elementary school.
Linda works in a bookstore and takes yoga classes.
Linda is active in the feminist movement. (F)
Linda is a psychiatric social worker.
Linda is a member of the League of Women Voters.
Linda is a bank teller. (T)
Linda is an insurance salesperson.
Linda is a bank teller and is active in the feminist movement. (T&F)

Most of the participants (87%) of ranked **F > T&F > T** ("This finding is neither surprising nor objectionable," comments Kahneman. "The description of Linda was construed to be representative of an active feminist (F) and unrepresentative of a bank teller (T). "

K&T found it "more surprising and less acceptable that the great majority of subjects also rank the conjunctions" (T&F) as more *probable* than their "less representative" answer (T).

Next, a group of 142 undergraduates at UBC were asked the following question:

[16] Bill was another imaginary person in a similar experiment, but in the annals of behavioral psychology Linda became famous, while Bill is almost forgotten.

Which is more probable?

1. *Linda is a bank* ***teller*** *(T).*

2. *Linda is a bank* ***teller*** *and is active in the feminist movement(T&F).*

This is a clear version of LINDA, in which the information junk intended to confuse the undergraduates has been filtered off.

Still, subjects with richer imagination and wider knowledge base will remain perplexed. What does "*Linda is a bank* ***teller***" mean in the **context** of the test? The second part of the question brings the logical operator AND into the flask. She is a teller AND not active outside the bank? She is teller AND nothing else?

The stages of problem understanding, noise filtration, orientation, retrieving relevant information, are part of any mechanism of reasoning. Obviously, the muddled initial information requires more cognitive effort than the filtered one. At a low motivation, the subject could choose a random answer in a multiple choice.

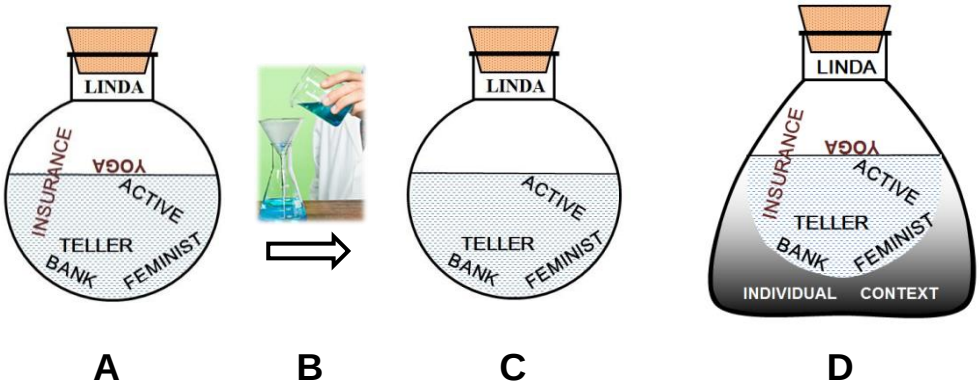


Figure 5. Mind content in LINDA.
A, B, C: Irrelevant matter is filtered off; D: Dark matter of individual context

"In a flagrant violation of the conjunction rule," (K&T) 85% of them found (**T&F**) more probable than (**T**).

The pattern-chemical approach means the following. In order to explain what happens, possible transition and final states should be constructed in terms of generators and bonds. Their stabilities should be compared. The more stable the transition state, the more likely the corresponding outcome.

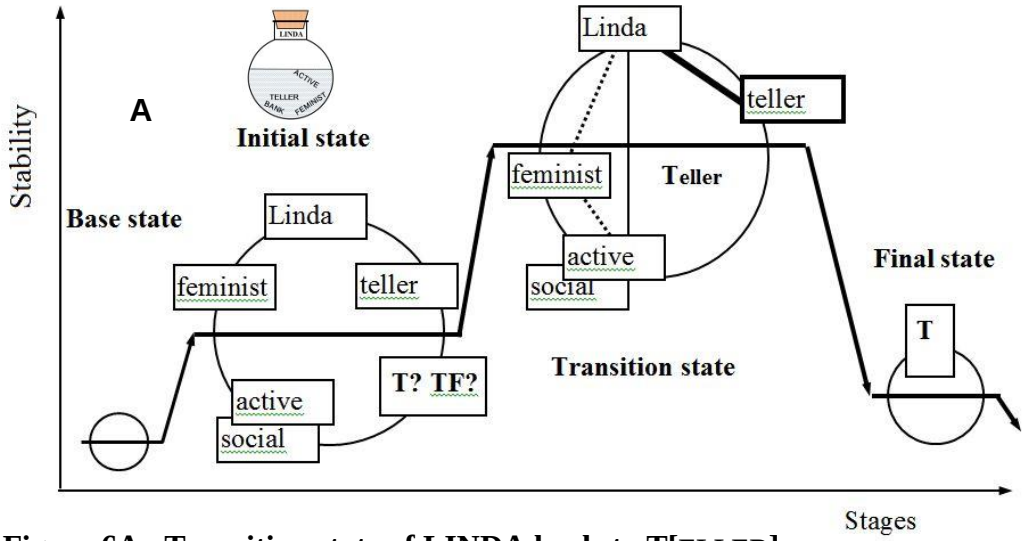


Figure 6A. Transition state of LINDA leads to T[ELLER]

At least two mechanisms of reasoning are possible. Mechanism **A** , **Figure 6**, takes into account that the idea TELLER occurs 2 times in the initial state. It is the main factor of stabilization.

In the initial state, the mind (circle) is filled with relevant ideas and activated .

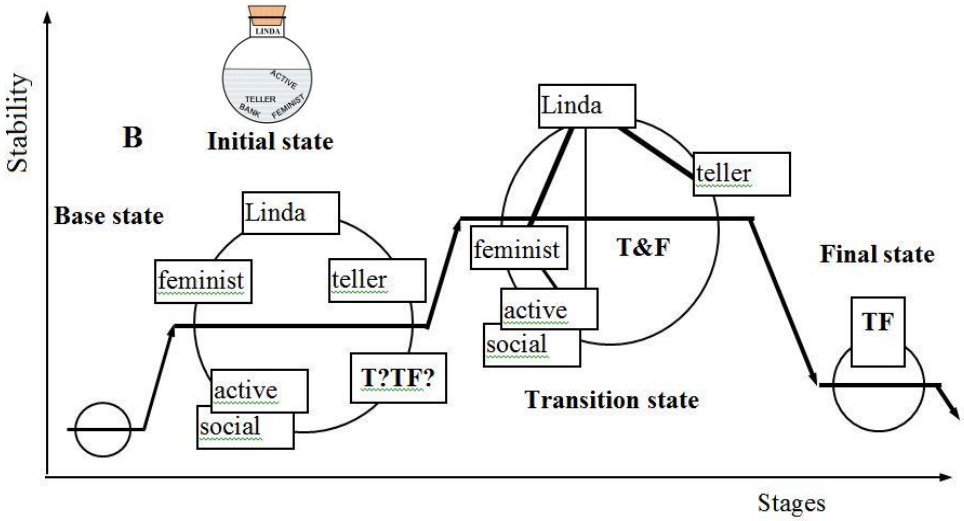


Figure 6B. Transition state of LINDA leads to T[ELLER]&F[EMINIST]

In mechanism **B**, the stabilization by the three bonds in the triangle LINDA-FEMINIST-ACTIVE plus the bond with TELLER cries out for TELLER & FEMINIST.

But this is not all, because the subject's mind contains a lot of personal information that can bond with the generators introduced by the question. "Individual differences" means not just parameters, constraints, and enhancements of intellectual abilities—the classical stuff of psychology—but also individual non-measurable and non-quantitative data, like some familiarity with probability or logic and Venn diagrams, being a female, feminist, or teller or having a boyfriend working in a bank, etc.

Figure 7 shows how **individual context**—background information, brought by the subject to the test in his head—interacts with the **current content**, i.e., information brought by the experimenter. This pattern-chemical reaction is what happens in any human mind initiated by a new situation.

The individual context of the subject's mind can be anything that he or she was preoccupied before the test, especially if the experimenter's content can have some associations with it.

A few out of an indefinite number of possible relevant associations:

1. BANK – MONEY – I-NEED
2. BANK – MONEY – COUNT – MATH
3. MATH – PROBABILITY
4. TELLER – MY-GIRLFREND
5. FEMINIST – ARTICLE – SEEN-YESTERDAY
6. MY-GIRLFRIEND – FEMINISM
7. MY-BOYFRIEND – ACTIVE
8. PROBABILITY – NUMBERS - TELLER

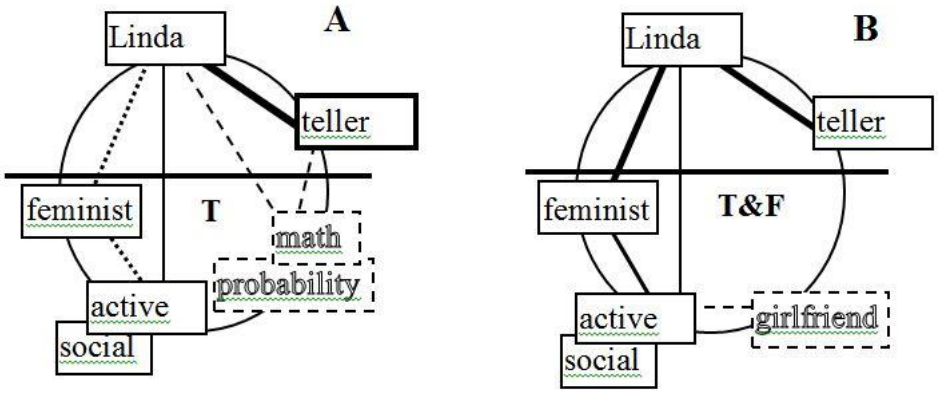
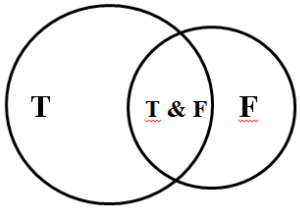


Figure 7. Individual context in the transition state.

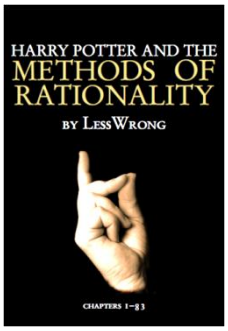
I also wonder who the 15% of the rational guys were: half of the 30% who gave the answer at random or the 15 % who remembered logic and elements of set theory. Probability theory is not



needed here because there is no event space for statistics. The stern rationalists were pestered for applying probability to one-time events. A mental image of a Venn diagram will do, even the subject never heard the term.

The famous LINDA and JIM experiments and their uncountable children that have populated the earth are pattern-chemically incomplete: they do not give enough space to imagination which is necessary for designing possible mechanisms. I cannot blame the authors. In molecular chemistry, all possible generators are listed in the Periodic Table. There is something more or less like Periodic Table for psychological properties of humans. But personal background is a realm of not just sociology, but the sociology of the current moment. Moreover, retrieving this background requires at least some good old talking association techniques and can be unjustifiably invasive.

I repeat that I am not qualified to judge professional academic psychology as an insider. I am, at best, a reader of Daniel Kahneman's book and maybe a dozen publications out of many hundreds or thousands. But I wonder why other than Meliorist possibilities have been so little explored in 30 years after LINDA. As an exception, I can mention Gerd Gigerenzer, who, instead of branding the college undergraduates with red hot iron, began to fight, successfully, those who manipulate the minds of patients with probabilistic junk in medical advertisement. The world still can be improved.



The answer is, of course: the economy. Meliorism sells. It is the major driving force of economy: our product is the best, it will change your life overnight.

It happens not because of somebody's ill intent and dishonesty—those are just moral tags. It happens because more money means better life. It increases individual stability and what increases stability happens indeed, until inequality begins eroding stability. Life since the 1970's has been under a heavy and visible hand of economy which is heavier than ever before and pushes only in one stressful direction instead of dispensing blessings of equilibrium and stability.

GOOD NEWS! YOU HAVE $1000!



I take this problem from **Investopedia** because the original work of K&T[17] uses the term *probability*, which has a well-defined meaning, especially in the market context. Investopedia uses the vague word *chance*.

What is "chance?" Is it an outcome decided by tossing a coin once, with money on the table? Or is it the reality of a businessman who does it every day many times, for years, so that the probability makes sense? But then what kind of sense can such statistic mean if market rarely if ever has any regularity in a long run? In his book, however, Kahneman uses the word "chance," the vaguest of all and full of mystique.

> **QUESTION 1.** You have $1,000 and you must pick one of the following choices:
> Choice A: You have a 50% chance of gaining $1,000, and a 50% chance of gaining $0.
> Choice B: You have a 100% chance of gaining $500.
>
> **QUESTION 2.** You have $2,000 and you must pick one of the following choices:
> Choice A: You have a 50% chance of losing $1,000, and 50% of losing $0.
> Choice B: You have a 100% chance of losing $500.
> If the subjects had answered logically, they would pick either "A" or "B" in both situations.
>
> However, the results of this study showed that an overwhelming majority of people chose "B" for question 1 and "A" for question 2.

My answer for a one-time event: If I am rich, I take choice A for Question 1 and Choice A for Question 2. I can afford to gamble.

If I am financially constrained, I take choice B for Question 1 and refuse to take any chances for Question 2. What can you do, shoot me? Then I will toss a coin to choose between A and B. Still, in a real situation, my individual context could probably break the ties. Each irrational mind, therefore, is rational in its own way, depending on the individual context.

[17] Daniel Kahneman and Amos Tversky, Prospect Theory: An Analysis of Decision under Risk. *Econometrica* ; March 1979; ***47*** *(2)* , 263, March 1979.

Interestingly, behavioral psychologist recognize that the rich and the poor have naturally different measures of money. In fact, the psychologists consider the discovery of this difference (known at least since Jesus Christ) one of their major accomplishment. Yet they keep designing experiments around the idea of money in the same normative framework as if everybody were already in a moneyless paradise, using the token money for playing Monopoly.



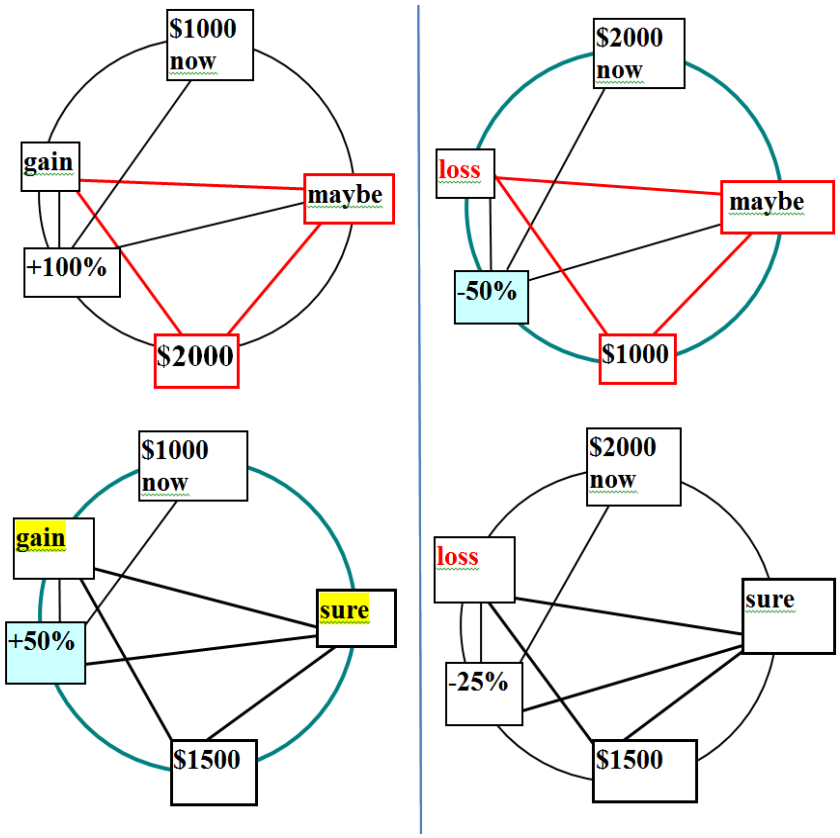


Figure 8. Mind configurations for Question 1 (left) and Question 2 (right)

As an outsider, I can afford a poisoned barb. The behavioral economics has an air of a make-believe Harry-Potteresque fairy tale: it is funny and it sells.[18]

Figure 8 compares the basic elements of mind content for Questions 1 and 2. As I see it, the major qualitative difference is between MAYBE and SURE. What are they, anyway? MAYBE is appropriate only for a one-time choice. SURE is the limit to which MAYBE approaches when making up one's mind in such situations becomes the subject's profession and the law of large numbers kicks in. For the profession of a trader, nothing ever remains the same in a long run, however, from the market hysterics to the vagaries of personal fortune. Unlike fairy tales, real

[18] The early original works of K&T, in my opinion, really made both psychological and economic contributions because they were put forward in the context of the existing utility theories, with obvious difference between both. In turn, they may not be the last word. The economics of academic science can be as cruel and scoffing as the economics of Great Deprecessions.

world does not guarantee a happy end. Moreover, philosophically, it guarantees an ultimate unhappiness in the longest possible run.

> I will abuse my outsider position once again. Where should behavioral psychology go next? Zurück, zu Freud and Jung: vorwärts! Back, to Freud and Jung: forward, to individual context.



LOVE AND MONEY

There has been a big discussion about the "endowment effect," or valuing something we own more than the same thing we want to buy. Note that the two things are never exactly comparable because we cannot have and have not the same thing and the content of our mind will be different before and after possession. Besides, the change in personal situation can change the personal rules of the trade. Nevertheless, here is, reportedly, not a make-believe but a modified real life story:

> A wine-loving economist we know purchased some nice Bordeaux wines years ago at low prices. The wines have greatly appreciated in value, so that a bottle that cost only $10 when purchased would now fetch $200 at auction. This economist now drinks some of this wine occasionally, but would neither be willing to sell the wine at the auction price nor buy an additional bottle at that price. (D. Kahneman, J. Knetsch, and R. Thaler. Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias, *The Journal of Economic Perspectives*, Vol. 5, No. 1. (Winter, 1991), pp. 193-206. Daniel Kahneman gives a longer and different version in his book.)

I am not going to immerse into the professional discussion. I only note that a single real life story cannot be either generalized or put in the same basket with typical undergraduate experiments. I have my own pattern representation of what happens with the wine-loving economist whom I will call Eco.

Love is a bond between two persons, two things, or a person or a thing. Attraction means that the bonded state is more stable than the separated one. Regarding a human and a thing, the difference can be measured in money and, according to the assumed laws of the market, the willingness to pay for a bottle to add to a stock or to sell a bottle from the stock should be the same. In Eco's case the willingness is very low, but not zero. The problem is that the wine collector, unlike the wine trader, does not want make money on his old purchase.
Figure 9 illustrates the difference between wine collecting and wine trading.

It is easy to imagine various internal and external circumstances that can be bonded, positively or negatively, to the transition state, changing the outcome. This, however does not matter because

the transaction is in both cases reversible, at least in the mind of the wine collector or the trader. Transition state is the same in both directions.

Neither adding a bottle to the existing stock nor subtracting from it will change the affection of the wine lover. Only a gain but not a loss of a part of monthly income will satisfy the affection of the trader.

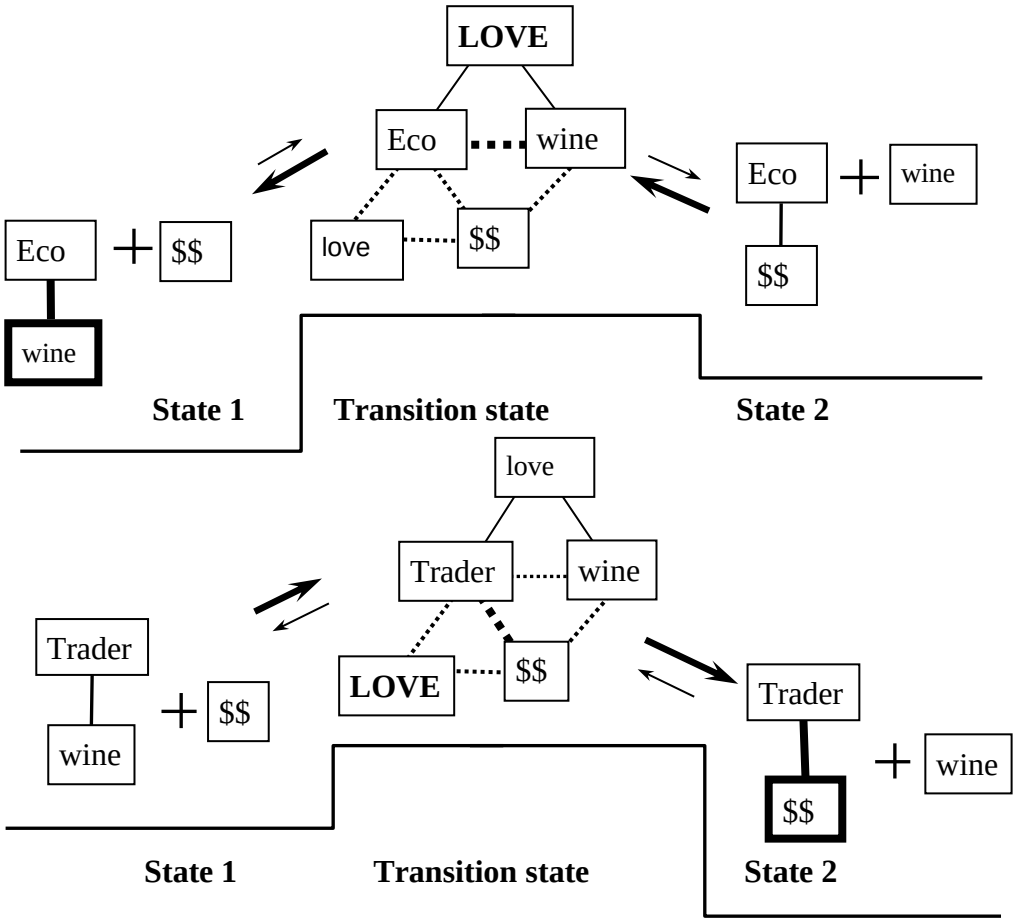


Figure 9. The case of a case of Bordeaux: states in equilibrium

Chemical reactions are mostly (in principle, all) reversible. They reach equilibrium at a position depending not on the transition state but on the relative stability of both stable states.

For the wine collector, preoccupied, as most collectors with the object of his passion, wine is more prominent (probable) in the mind content. For the trader, it is money. Therefore, the equilibrium is **shifted**, as chemists say, to more stable configuration of the two. Yet this regularity is statistical. **Figure 9** also applies to cognitive dissonance.

This example might suggest a simple explanation why economic reality and realities of human behavior are not quite similar: the difference is between the statistically baseless world of one-time events and the swarming relentless unstoppable global economy with its statistical base.

The enormous concentration of wealth in society after 1970's and the monstrous inequality of market players is, probably, the best explanation of clinical **irrationality** of American economic and consequently, political organisms. *Ergo*, the Great Deprecession. We are becoming the property of a small family.

My prediction is that everybody involved in systematic reversible transactions with unequal attraction to object of exchange will from time to time deviate from any entrenched habit. This is a good illustration of the possibility of individual statistical regularities along the time line—a far cry of psychological experiments which are always virgin.

No wonder, the endowment effect is one of the most disputed "fallacies" of behavioral psycho-economics. It is so simple that it will not pass for science without bells and whistles.

My purpose was to illustrate pattern chemistry with results borrowed from a single domain of research in psychology. To toss barbs is just part of my gain in the form of fun—one of very few valuables not measurable in dollars.

I must remind again (for the third time) that my judgment, background, and knowledge base are not professional and I am definitely not familiar with many important works in the field. I am outside the professional research area. I am interested only in Pattern Theory, where my credentials are also not too high, and pattern chemistry, where I am in solitary confinement. But I have a truly irrational hope that the latter may change.



RATIONALITY GAP

This is my first and last Essay driven by my skepticism regarding a big and thriving area of experimental research. However often (many times in this Essay) I emphasize that I am an outsider and my only qualification is being a reader of a recent popular book addressed to people like myself, I cannot hide my surprise at the uncomfortably low level of imagination, logic, and experimental rigor in this area, at least from the point of view of traditional hard experimental science like chemistry. This is a mess, and a few pearls in the mud do not make it shine.

The term "individual differences" of Keith Stanovich had deceived me. It turned out to be reclassified individual abilities, which can, naturally, give birth to new possible fallacies and shortcomings of human mind.

Something prevents psychologists from fully including into the picture the most important natural factor of human thinking: the individual content, created by entire previous life of the subject, of which only a small part shows on the surface of consciousness, like the top of the

iceberg. The economic psychology for 99%-ers and 1%-ers should be two different sciences, not one. The Kansas Board of Education rationality and MIT rationality look like they come from the opposite wings of our Galaxy.



The most striking illustration of the rationality gap (don't ask whose rationality) is the question "Would you prefer $3,400 this month or $3,800 next month?" used by Shane Frederick in his analysis of "Cognitive Reflection Test (CRT)[19] results. In the low CRT group, 35% preferred next month, while in the high CRT group 60% showed more "patience," as it was interpreted by the author. Note that high CRT group included well poised students of MIT, Princeton, and Harvard, while the group of the edgy ones attended Bowling Green, Michigan State (Dearborn), and University of Toledo.

In his presentation on CRT, Shane Frederick denied the role of the wealth gap between the higher and lower grade GATTACA groups, in my view, unconvincingly.

Here is the comment of Daniel Kahneman in *Thinking Fast and Slow*:

> Only 37% of those who solved all three puzzles [on which CRT is based] correctly have the same **shortsighted** preference for receiving a smaller amount immediately. (p.48)

What were the tree fateful questions, quite like in a fairy tale? [20]

> (1) A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? _____ cents
> (2) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes
> (3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days

I greatly sympathize with the millennium generation who will be tried at human resources by rationality tests, urine analysis, and saliva swab in their 40's and 50's.



I begin to think that breaking up with Freud and Jung was a misstep for psychology because it lost sight of what makes us individual as nations, artists, scientists, leaders, lovers, and spouses: our roots, genes, upbringing, biographies, and bedroom secrets. Like economics, psychology comprises all human matters. Although it is much more conservative and narrow-minded (sorry),

[19] Shane Frederick, Cognitive Reflection and Decision Making**,** *Journal of Economic Perspectives—Volume 19, Number 4—Fall 2005—Pages 25–42*

[20] "The boy is confronted with three questions on his journey, as he travels between two towns and across the river." (**The Devil with the Three Golden Hairs**)

it surpasses economy by primogeniture. Human nature is the oldest and most stable factor in the evolution of economy—more stable than even the climate and local geography. Whether human nature is good for economy (it is definitely good for politics) or its modification or even substitution will be even better is a separate big issue. I hope to touch upon it in the next Essay 59.

It is my impression, after a short reconnaissance, that behavioral economics, in spite of its enormous experimental material and numerical interpretations, is full of contradictions. Here are a few examples from Kahneman's book.

> (1) The example "$3,400 now or $3,800 later" obviously (maybe only to me) contradicts the central point of the prospect theory: the evaluation of gain or loss is rational not in absolute numbers, but relative to the reference point. If so, the position of the subject on the wealth ladder defines which decision is rational and which is not. Without personal data, the question does not make sense.
>
> (2) "The science of availability" (p.129) tells you that it is irrational to rely on your recent experience and, generally, on what is currently most active in your mind. That may be true regarding weather in the Windy City. But by the same logic, it must be irrational to rely on your current monetary reference point: it can change by next morning. Maybe it has already changed and you don't know about it. Or never knew. Exaggeration of your assets is another "fallacy."
>
> (3) If you want to rely on statistics of diseases, accidents, crime, and other rare unpleasant things, you will be rebuked for exaggerating your own risks. Statistics, however, is based on data about large numbers of people who are complete strangers to you. What matters is where and how you live **your** life. In order to develop your own realistic statistics, you need to analyze your own lifetime behavior (time series). Using Daniel Kahneman's example, you can die in a Jerusalem bus only once (p.333). By the time you are finished analyzing, you will be finished indeed. This is why Plato warned not judge a man's life happy until he dies.



PLATO'S WARNING

In his book *What Intelligence Tests Miss: The Psychology of Rational Thought* (Yale U.P., 2009), Keith Stanovich refers to two life stories. Two very intelligent people, professor of mathematics John Allen Paulos and David Denby, a writer and film critic (whose reviews I greatly enjoy and trust) lost a lot of money in stock market, as they acknowledged, because of irrational trading. They wrote books about that. I have read only *American Sucker* by David Denby.

The stories have a beginning and an end and are **diachronic** experiments run by nature, like any life story and any chemical transformation in the flask. Both people failed in achieving their accessory goals, but not of their primary ones. I am sure their stories can be counterbalanced by two others: of people who bought a single, at the time obscure stock, and made their fortunes without moving a finger. The names of the lucky ones are much better remembered than the names of the losers. In my opinion, the behavior of the two intellectuals was irrational only from the point of view of the rules of the trade, some of them as contradicting as any folk wisdom. But if the idiotic behavior of the majority of stockholders was **the norm** during the dotcom bubble, it cannot be generalized as irrationality.

I suspect that by a careful Freudian analysis on a couch, the behavior could be either explained by some personal circumstances (clear in the case of David Denby) or shown as a **pattern** repeating several times throughout life in different configurations.

> In this Essay a là Montaigne, I easily acknowledge that I used to make mostly the same mistakes all my sufficiently long life. I had learned from some of them, but not all, by the time the lessons became useless.

I also suspect that both people, clearly of very sharp intelligence, simply did not love money enough to get a good market **education** and were unable to fully commit themselves to making money. I believe, their professional occupations were the biggest distractions from their stock market exploits. Like the wine collector Eco, they probably loved mathematics, movies, and writing—and maybe just intensity of life—more than playing lottery.

Unlike **diachronic** tests, psychological rationality tests, however, are incomplete **synchronic** (one-time) experiments that neither allow for statistical generalization nor take to account the entire mind content, nor pay attention to the powerful factor of education.



ECONOMY OF ECONOMICS

In natural sciences, you are successful if you make everybody agree with your ideas and results. In humanities, you can make a career by opposing somebody's ideas. In economics… well, it is different.

When I ask myself about possible reasons for the "strangeness" of the situation as I see it, the answer is immediate: behavioral **economics** is morphing into **economy** of right behavior, joining the economies of well-being, good health, seductive beauty, and true religion. Its message seems to be: "Your behavior is wrong, your mind is full of fallacies, we can cure you and make your mind **less wrong**®, and you will prosper even more."

Compare with "Your body is ugly, you are fat, your face is full of wrinkles, we can cure you and make you look less wrong, and you will shine."

The list of fallacies or biases is long, growing, and growling at us. There are currently 92 "Decision-making, belief, and behavioral biases," 24 "Social biases," and 52 "Memory errors and biases," the total of 168. The list, by the way, does not leave any doubt that fundamentalist, literalist, and politicized religion is the worst clump of fallacies, although it is not even mentioned[21].

Has anybody attempted to encompass the "biases," which is a milder term for "fallacy," within a single conceptual framework? I do not see any offer of a single theory, however tentative, and, according to my search, nobody does. This situation associates in my mind with the medicalization of human condition, especially, in psychiatry. I would call it irrationalization of common sense—a psychologist's fallacy to consider deviation from a vaguely defined arbitrary standard as a disorder or disability. Is an exceptional talent a disability? So many great people occasionally or constantly manifested strangeness and "irrationality," which in no way ruined their lives.

What does all that tell me? I believe that a united comprehensive and consensual psychological theory is possible. Psychology is one of the most attractive areas of science exactly because it is loose, contradictive, incomplete, and yielding to the pressure of economy. There are a lot of great things to do.

I believe in the most abstract, broad-minded, and comprehensive approach to the mind. I believe in Pattern Theory as the most abstract and rigorous theory of the human mind, inexplicably overlooked even by those who write about patterns.

Why chemistry is the right pattern paradigm of treating complexity of the mind is beyond this Essay. I can only give three hints.

> (1) Life has a chemical origin; mind is a product of evolution of life; evolution of exystems—evolving complex systems—follows the principle of simplicity: complex systems emerge from a simple beginning through a sequence of simple steps because only simple objects can emerge accidentally and simple steps can be made spontaneously.
>
> (2) Chemistry is diachronic: its main problem is the process with the beginning and an end, moreover, with several possible ends. The outcome depends on the speed of competing scenarios. The fastest runner wins, most of the time. The difference of psychology form chemistry is that there is only one runner instead of zillions.

[21] John Allen Paulos wrote a book *Irreligion: A Mathematician Explains Why the Arguments for God Just Don't Add Up* . I haven't read it. I do not think science and religion have anything in common, although they, like animals and plants, came from the same seed: drive for understanding.

Psychology of the American elections and popular choice in general is more "chemical." This is a big opaque flask. See Essay 57.

(3) It has been noted quite often, that nature, having once invented some evolutionary trick, tends to repeat it again and again. Chemical evolution had been the first trick and it was generalized and appropriated by all subsequent stages of evolution.

PARTING WORDS TO A YOUNG PSYCHOLOGIST (and more stone)



Economics and business management recommend a beginner businessman to find a market niche. As many as 168 possible niches of cognitive "fallacies," with more on the ways, are better than a single congested marketplace where the winner sooner or later takes all.

Ambitious young psychologist dreaming of conquering highest peaks of science and loathing to rent a niche in a cliff, pattern chemistry is yours. Have in mind, however, that such exalted goals are irrational, we are told by theory of rationality, because their probabilities of realization for a person taken at random are practically zero.



2012

Essay 59. THE KNOT

HUMANS, IDEAS, THINGS, AND EVOLUTION OF ECOSPHERE



2013

Ist er ein Hiesiger? Nein, aus beiden
Reichen erwuchs seine weite Natur.
Kundiger böge die Zweige der Weiden,
wer die Wurzeln der Weiden erfuhr.

Is he a native? No, his ample nature
emerges from both kingdoms.
He who understands the roots of the willow
is better skilled in weaving its twigs.

Reiner Maria Rilke
Sonnets to Orpheus, Part I, VI



The image of Atlas on the right is taken from the *Nordisk familjebok*, *Sweden's* Encyclopedia in 38 volumes, 1876-1926. Mythological Atlas is holding the celestial sphere, commonly misunderstood as the Earth, on his back. Atlas means also a collection of maps, mostly of the Earth. There is a clear evolutionary pathway between both meanings. *Atlas of Brain Maps* is a relatively recent development. In this Essay, I am preoccupied with the pattern similarity between the globe that carries us and the brain—the globe we all carry on our shoulders.

CONTENTS

1. ECONATION
2. TREE
3. NETWORK
4. CIRCLE
5. KNOT
6. *ERGO…*

APPENDIX:

Pattern Theory and pattern chemistry
Mapping
Marximum and social justice

For previous **Essays 1 to 56** see: http://spirospero.net/simplicity.html
and http://spirospero.net/essays-complete.pdf

1. ECONATION

With time, the difference between my Essays in simplicity and other e-publications in complexity has been vanishing. The most benign of the reasons for that is that I have completed a structure of ideas answering my life long questions about the Everything: why is Everything complex and how could it emerge? In short, the answer is that a complex system begins as an object so **simple** that it can emerge spontaneously and it further evolves by **simple** steps. The key to understanding Everything is to turn to the simplest representations—patterns—of its history

My structure stands on the premises of Pattern Theory (Ulf Grenander). It displays an ambitious sign board "PATTERN CHEMISTRY," although it has gaps, holes, and cracks in the walls. It is not supposed to be as tight as a physical theory, however. It should allow a free flow of time, ideally, like a wattle hut or a dragnet.

I raise the pronoun "everything" to the rank of noun: the Everything is all things in the world, πάντα in "πάντα ῥεῖ," *everything flows* of Heraclites.

Following Michel Montaigne, I simply express what flows through my mind. It is not a reliable source of academic knowledge. It could be just a fantasy. Or something already suggested. Or, it could be a source of some new direction of thought, as fantasies often are.

I am coming back to my vision of a strange evolutionary phenomenon, which could be something real and definitive for human history for some time ahead. It is a close, tangled, coiled relation between humans, ideas, and Things, HITs, for short, with organic life and even minerals, water, and air stuck in the coils. To avoid ambiguity, I capitalize Things meant as a species, moreover, as a "nation." I expect the trefoil knot on the title page to symbolize this phenomenon better than a thousand words. I still need almost 16,000 more.

Technology (man-made things reproducing from blueprints) and ideas (reproducing themselves as memes) have already been looked at as life forms similar to organic DNA- and RNA-based life. I am not sure, however, that all three have been looked at as taxonomic domains of the

single higher super-kingdom. This idea has its precursors. Among them, the ideas of Gaia (James Lovelock) and a casually expressed and undeveloped but unforgettable concept of noosphere (Vladimir Vernadsky) should be mentioned. Probably, there are other important ideas of which I am not aware. To follow everything said about Everything is an experiment with infinity.

It would be good to have distinct but egalitarian terms for humans, Things and ideas (HITs). *Technosphere* and *noosphere* are clumsy, vague, and already taken. We can call the natural, not man-made life Bios. It may sound good for organic life, although tainted by computer science (*Basic Input/Output System), but not to the English ear*. I like Technos for Things. *Mentos* (from Latin *mens*, mind) for ideas, sounds artificial. *Humus* for humans? No way! Anyway, *humans, Things*, and *ideas* are fine with me. What we really need is the generic term for all three, and I suggest the already existing *ecosphere*, where they could be found. Ecosphere is their habitat and I see the three "super-life-forms" as *econations* (**eco-nations**). I hope something better could be invented. I am for the unpretentious but 100% accurate word *economy*. Like the word *things*, it could be misunderstood, however.

Made of a different stuff—although the difference narrows—but inseparable from humans at birth, Things and ideas seem to be splitting from the initial entirely organic evolutionary branch into separate twigs, following the grand pattern of evolution. The Things comprise man-made things, services, and pleasures, i.e., products of economy, in other words, everything exchangeable for money, as ideas and hired or enslaved humans also are. I include public ideas into products of economy, too, which is a relatively recent phenomenon, if we put aside the history of education. As for Bios, today it is completely enslaved by humans[22], although numerous abolitionists try to legally represent and protect it. It has some slim but real chances of cultural autonomy. The independence may be attainable at the very end of serving Growth the Unlimited, the idol of the new global paganism, prophetically illustrated by Goya.

We, humans, Things, and ideas are one **Economy** under the Sun. We are of the same pattern blood. We fight, as brothers do. We all are the metabolites of economy, its masters and slaves. We all can be bought for money, which, changing shape, color, and sound through history, today is hardly distinguishable from ideas (see **APPENDIX 3**). The idealization of money has been the most recent and deepest evolutionary shift and digitalization of ideas is just the other side of the new universal coin.

We all compete for limited resources of energy and matter—even the now naked paperless ideas that need rare earth metals for digital devices, their new dress. We are alive while we can evolve, but toward what? Deciding what is good or bad, we now need to specify for which of the HITs.

This Essay is yet another exercise in pattern reasoning. I will try to minimize repetitions. Details and explanations can be found with Google search in **"Yuri Tarnopolsky" + complexity OR simplicity + [topic]**.

[22] Harmful viruses and bacteria are still waging a guerilla war.

As a believer in evolution and adaptation, I am against condemning modernity. I am for its understanding. I do not sympathize with conservatives of any kind.

2. TREE

The tree of biological evolution has been portrayed countless times. See three examples in **Figure 1**. The curious thing is that very few, if any, "trees of life" go deep enough to the roots which every tree is supposed to have.

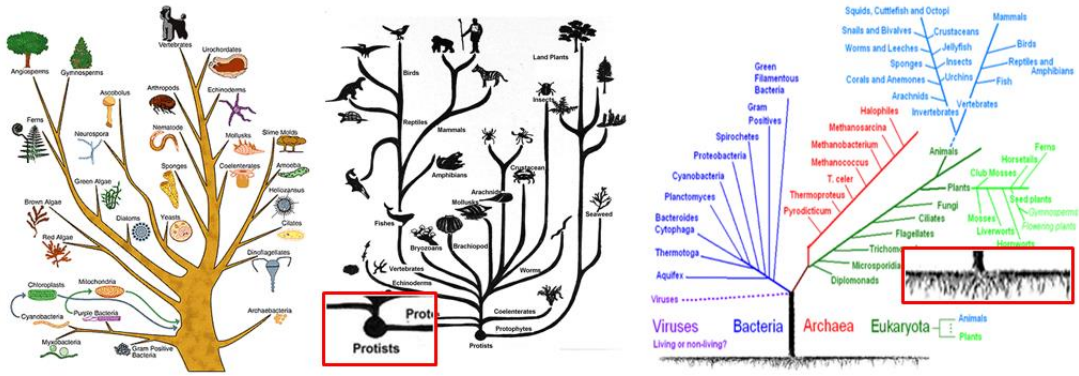


Figure 1. Images of the tree of life. Points of origin are enlarged in red frames.

Figure 2 shows a borrowed from the Web selection of evolutionary trees with some attention to their parts hidden in the distant past but also in the dead substance of the upper layers of the Earth.

Figure 2.1 was one of the first detailed phylogenetic trees for plants published by Heinrich Georg Bronn in 1858.[23] It has roots of no specific meaning, just for botanic veracity. **Figures 2.2** and **2.3,** with some hypothetic amoeba-like creature as the first life form, were designed by the creationists who wanted to fight Darwin with his own ideas, but they are quite expressive.

[23] Source: http://listoffigures.wordpress.com/tag/phylogenetic-tree/

There is nothing, at least in the solar system, without a previous state. Both the Earth and life on it must have some predecessor. In **Figure 2.4**, I present my own visual metaphor of the evolutionary roots of life. Its meaning, however, is factual: life emerged from the "dead" physical and chemical substance of the planet. Of course, our planet looked differently without its blue and green outfits.



My epigraph from Rilke refers to the origin of life and everything human with it. I supplement it with a visual metaphor on the right.

Planet Earth is a system. The globe in **Figure 2.4** represents the ecosphere of the earth: the outer layers of lithosphere (minerals), hydrosphere (water), and atmosphere (gases) in which life (biosphere) exists together with, in my perspective, humans, ideas and Things. I certainly follow the Vernadsky pattern and I have no serious objection against *noosphere*.

> The concept of noosphere has never been clear cut and today it looks especially muddled. Russia is currently (2013) commemorating the 150th anniversary of the birth of V. Vernadsky. It is not forgotten in Russia that he imagined the ultimate noosphere as the global victory of the Marxist-Leninist "democracy" becoming a geological planet-transforming force. Nevertheless, V. I. Vernadsky was the first to place it in the same pattern as other spheres of the earth. He ascribed the invention of the term to Édouard Le Roy (1927), although Teilhard de Chardin suggested it in 1922. Both French philosophers had listened to Vernadsky's lections in Paris.

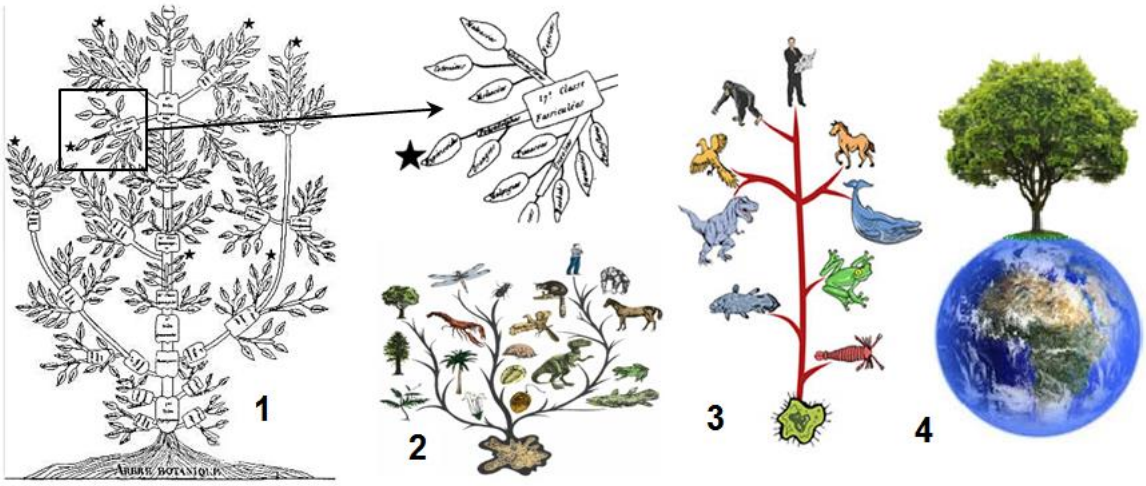


Figure 2. Evolutionary trees with "roots." See text.

I include Technos, the man-made Things[24], to the "sphere of spheres," or ecosphere. The outer layers of the Earth are a place for **cohabitation** of Bios (organic life), humans, their ideas, and Technos.

[24] "Man-made" is a simplification. Things are also made by Things: cell phone accessories are made by cell phones as much as by humans.

By ecosphere I mean the layers of the Earth and near space accessible to humans, Things, and ideas, which is much wider, higher, and deeper than the habitat of organic life. I have not found the roots of the term *technosphere*, which is applied to everything designed by humans. I put emphasis on man-made Things and I place design in the sphere of ideas. To summarize, the earth is a place where humans, Things, and ideas coexist with organic life and inanimate matter in the ecosphere similar to the way organisms and species coexist and compete in biosphere. In other words, I suggest placing humans at a humbler rank in a larger company.

> I am not a believer, but I appreciate the poetic and artistic side of religion and want to use the Abrahamic religious terminology to clarify my thought: as Man is created in the image of the Creator, the creations of Man are in the image of Man. In the language of Darwinism, for a balance, as Man had evolved from primates, so Things and ideas have been evolving from Man in **struggle** for existence. Even such a powerful idea as God is licking its wounds after the suicidal blasts of terrorists. The dead can be buried, but ideas do not die.

I see the term **economy** as the modern name for the cohabitation of four econations, organic life included. In times of Pierre Teilhard de Chardin (1881-1955) and Vladimir Vernadsky (1864-1945) and not until the beginning of the twenty-first century, nothing was truly global, except the British Empire and radio. In modern economy, on the contrary, nothing is local, even rural backyards, poverty, and isolation, even the rarest of the animal species, and not even human bedroom peeped into by mini-drones.

Cohabitation seems to me a more exact term than coexistence. It requires obtaining, sharing, and distributing limited resources in a household or, maybe, a cult compound, in which inhabitants are not necessarily relatives. It is life in a cabin with flower pots on windowsills, a wood stove, a cat, a dog, and a garden outside.

After the inanimate earth had given birth to organic life, both geosphere and biosphere formed a global system in which both changed. Geosphere and biosphere were involved in various kinds of cyclic patterns of change. Organic life let the thinking-making humans out of Pandora's box and a new—triple knot—of a system, for which economy is the term, began its twisted circulation of energy.



Mountains are resigned to their fate and the universal forces of change that brought them to existence and will level them out. Life, however, is adaptation to instability. It survives external instability by being internally unstable. It is an exystem (evolving complex system): far from equilibrium, it is never fully asleep.

Life needed something to keep it awake during the very first minute of emergence, before the first intake of food and burst of internal energy. Life emerged from geochemistry in the cradle

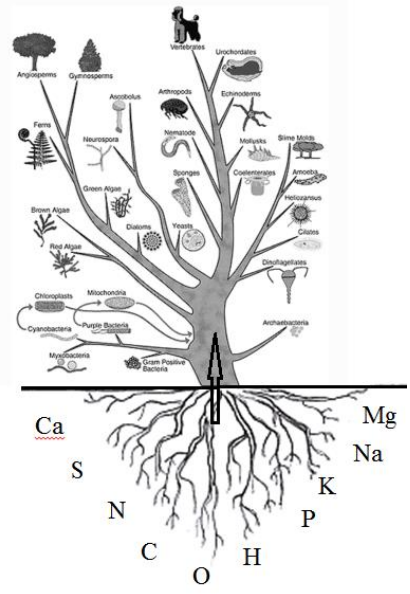


Figure 3. Geochemical roots of life on earth

rocked by the planetary rotation and all periodical and irregular processes on earth.

The spontaneous origin of life was possible because the first life was simple and simple systems have a limited number of possible configurations. The roots of life grow down into the geochemical substrate of the upper crust of the Earth (lithosphere) and its fluid components. The soil and oxygen in our ecosphere grow from organic life. Technos devours soil and exhales carbon and nitrogen oxides. It sounds metaphoric, but it is the language of patterns.

Figure 3 connects the trunk of the evolutionary tree with the roots: the available elements form simple molecules and ions which further aggregate and recombine into organic mass under the influence of geophysical processes. The figure symbolizes not a state but a process of evolution that started as a cosmic planetary development.

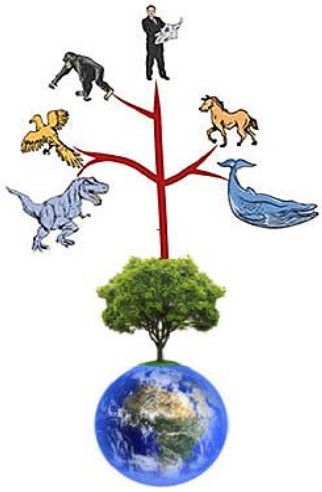


Figure 4. What's next?

In **Figure 3,** the system of minerals, water, and gases generates the dramatically different **organic** life. I stress *organic* because there are other life forms, such as Technos with Things, human societies with culture, and culture with memes. The major difference between the HITs is the phenomenon of memory, i.e., information stored in inorganic, as well as organic matter: genome, books, human and computer memory. It is something that survives individual Things, organisms, and great thinkers and evolves by elementary steps.

The tree in **Figure 4** bears a new fruit**:** the man, his business suit with stuffed with Things pockets, and the newspaper full of ideas. Evolutionary biologists could recognize it as coevolution, the typical example of which is the bond between bees and flowers, which needs only to hook up honey production by beekeepers and their equipment to be considered a mini-ecosphere, a module of the larger agricultural module. In a module, the components evolve along their own pathways but stay together.

Can the newspaper follow the evolutionary pattern of the dinosaurs? Yes, the *NYT. rex* is already evolving toward dematerialization. But it stays in human environment and employs human staff, don't ask for how long.

The triad at the top of **Figure 4** is also a **modular** mini-ecosphere inhabiting an individual human body and its outer space.

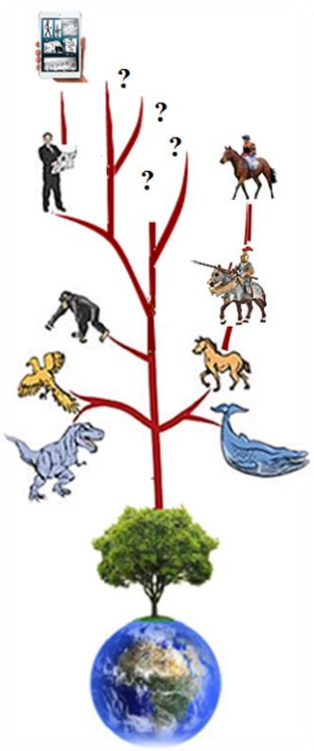


Figure 5. Then what?

Figure 5 illustrates the evolution of another module: horse riding. As some humans acquire newspapers, some horses acquired humans. Or, we can say, humans developed horses as removable organs before the first newspaper. The bond between humans and horses, although on the wane, still persists. Similarly,

although each member of the trio will evolve along its own pathway, as a newspaper branches off into a mobile computer, they will stay close to each other, like humans and horses. This is what I call modularity and we will come to that matter regarding a different kind of the globe.

In production of honey everything stays **close**: the beekeeper, bees, fields and meadows, and the equipment. But what does it mean? Our language is anthropocentric because it was originally for humans only. Its ancient vocabulary comes from humans and their limited in space habitat. Some words, like to have, make, want, good, and bad lose meaning in science and others, like **close**, acquire new one. Mathematics and theoretical physics are full of such aristocratic descendants of humble ancestors.[25]

Most of the subsequent parts of this Essay are about closeness. What does it mean to be close on the map of the world and on the map of the brain? How does closeness evolve? I am going to take a very narrow pattern chemical angle of vision.

Things, except business suits, evolve fast. They cling to human body and sneak into it. The wearable computers are already putting a feet in the door, anxious to interfere with various daily activities of humans and the "smart" phone already does it, even pushing the classic wristwatch into the company of mechanical typewriters. It matters less and less whether a tablet or a phone lives in your pocket or head. But wait for **Google Brain™**.

Can we say that horse evolved into automobile as a means of transportation? In a sense, yes, but not in a biological sense because there are no intermediate steps between the horse and the automobile. Neither there is a middle stage between paper and computer. Yet cars and computers have been evolving through mutations, quite like species, reproducing from a design template in the womb of technology.

Things and ideas came into the world inseparable from humans. Being human means to have ideas and make things. It also means to have a limited life, the last half of which usually runs in the visible shadow of mortality.

Can the taxonomic super-kingdoms of humans, Things, and ideas be really independent econations? What does it mean to be independent in the ecosphere in which nothing except the geophysics of the earth seems to be independent? My tentative answer is: no. The words like "to have," "to make, and "independent" are of little use in untangling the web of relations between the inhabitants of the ecosphere grown on the tree of life. The econations are all similar in how they form exystems with their template (DNA, blueprint, text), inherent instability, and dissipation of energy. Why would we say that humans keep the ultimate control over what they make and think? Not everywhere and not always have they the power to say what they think, let alone act and make.

The image of a tree of life masks the fact of an evolutionary drive to total interdependence, called economy.

[25] Michael Pollan has wonderful examples of this deficiency of language in his ***The Botany of Desire: A Plant's-Eye View of the World***.

Even the ancient dinosaurs from Mongolia are pulled into economy[26], not to mention the distant past, in which the Big Bang, the theoretical beginning of Everything, pushed aside the story of Atlantis, the attraction of the previous centuries. As for the future, it has been a profitable industry for ages, contriving all kinds of aliens, almost universally powerful and repulsive.

The inclusion of different spheres of ecosphere or, in my terminology, different econations into a network of connections as result of the weakening and loss of metric distance in time and space is a novel and striking pattern of modern ecosphere. I was lucky to observe its emergence throughout my life, which, by the way, began under sounds of air alert and bombardment, the lullaby of the WW2.

By the end of my long exploration of Pattern Theory, with my mind, irreversibly tuned to patterns, I detect a seemingly far-fetched **similarity between the ecosphere and human mind**. It is surprising for a moment, as always with the New, but then it looks obvious. Moreover, it is an idea with ancient roots and a great obsessive power. But I cannot afford another distraction here, go astray, and drown in philosophy.





[26] In what was called a million dollars dinosaur scandal, the bones of a Mongolian dinosaur were illegally smuggled out and put for auction in US (2012).

3. NETWORK

The growth of network science within the computer science was stimulated by Internet and its money-making endeavors.

> DISCLAIMER: The network science is today a very large area, in which I am absolutely not an expert—as well as in computer science, brain anatomy, geophysics, economics, etc., with a limited exception of fundamentals of chemistry. But the language of patterns does not recognize academic maps of the world.

Dynamic network analysis, in particular, the Internet connectivity and the new exploding area of study of connectome (connectomics) is a new intensive area of research. Both offer a striking imagery, which I borrow in **Figure 6**, adding to them the humble thousand year old road maps because they belong to the same pattern as the Web networks and connectome. There is a deep similarity between not only their configurations, from the point of view of Pattern Theory, but also between their imagery. Unfortunately, to discuss all that would take a lot of space.

All such networks consist of points and lines, or at least lines with endpoints. The similarity of all physically different networks is well realized in scientific community.

> Historically, many non-neurophysiological systems have been used as explanatory metaphors for the brain, perhaps the most recent examples of which are the computer and the Internet [72]. The mind–brain dualism has been simply likened to the relation between software and hardware in a computer system. Due to recent advances in diffusion weighted imaging, the large-scale wiring diagram of the human brain has been estimated and its organizational structure has been directly compared to that of computer chips, specifically very large-scale integrated circuits [7]. Striking similarities are evident, suggesting that both technological innovation and natural selection have discovered similar solutions to the problems of wiring efficiency in information processing systems.
>
> Danielle S. Bassett[1] and Michael S. Gazzaniga, **Understanding complexity in the human brain,** Trends Cogn Sci. 2011 May; 15(5): 200–209. doi: 10.1016/j.tics.2011.03.006 http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3170818/ . See also Bassett DS, et al., **Efficient physical embedding of topologically complex information processing networks in brains and computer circuits**. PLoS Comput Biol. 2010; 6:e1000748, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2858671/

The difference between pattern and metaphor is subtle and controversial. In my view, metaphor takes a configuration *A*, which is the subject in the focus of interest, for example, human life and puts it side by side with a similar configuration *B*, for example, journey, but without any interest

in journey *per se*. Each is a process with beginning, end, and duration, filled with events. In Pattern Theory, pattern is the entire space of configurations forming a group under the similarity transformation. Any of the configurations could be chosen as a template. The latter is a starting or otherwise marked point for similarity transformation, roughly, a typical configuration. Pattern is everything that is connected with the above rule of similarity, whether we know about it or not.

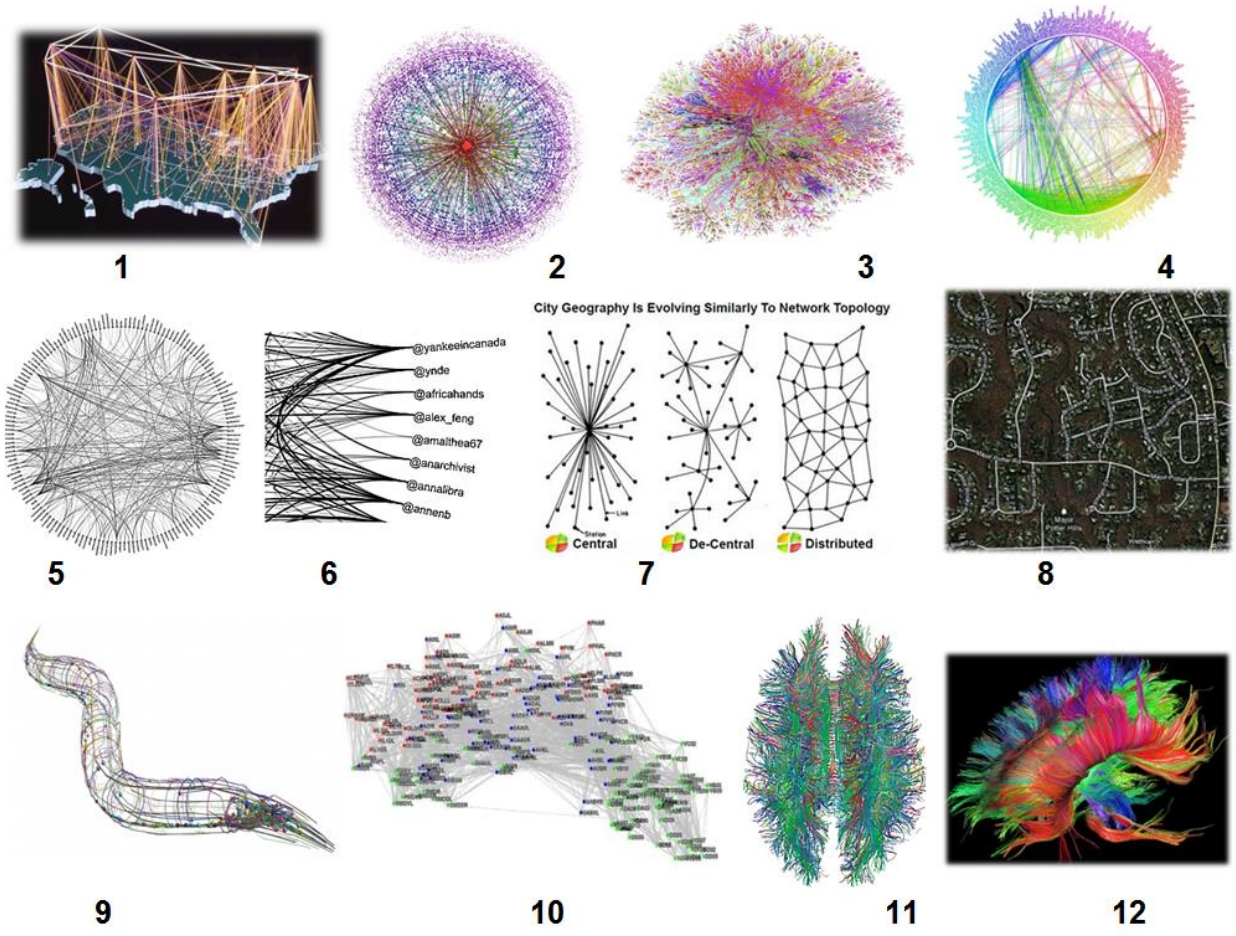


Figure 6. Networks. 1, 2, 3: Internet; 4: Facebook; 5, 6: Twitter; 7, 8: town; 9, 10: nervous system of *C. elegans*; 11, 12: fibers of white matter in human brain.

> … My conscience, thou art fetter'd
> More than my shanks and wrists: you
> good gods give me
> The penitent instrument to pick that bolt,
> Then free for ever! Is't enough I am sorry?
>
> Shakespeare, *Cymbeline*, V,4

For a poet even life is too abstract a notion and a metaphor puts it down on the ground. A poet uses rose as metaphor without any botanical associations. Posthumus in Shakespeare's *Cymbeline* is not a philosopher locksmith. If I find Pattern Theory poetic, it is because I am obsessed with it in my own personal way.

My goal in this Essay is to explore the general pattern of the evolution of the ecosphere of econations, which includes the future, as well as the past. Fascinated by the ongoing mapping of

the brain, which I see as similar to the mapping of the world fifteen hundred years ago, I ask myself the following question:

> If brain is similar to the globe in some way and if it is very old and changing very slowly, if ever, what can our understanding of the brain contribute to the understanding of our fast evolving global ecosphere?

I believe this kind of question is natural within the framework of Pattern Theory. I want to use pattern similarity of the human brain to ecosphere as of one configuration to another. Since by human standards[27] the brain is evolutionary old and stable, while the ecosphere with the three econations is evolutionary young and fast changing, where is the ecosphere going as configuration? Is the changing since the Industrial Revolution with dizzying speed world means that we are in the pattern-chemical **transition state** between two dramatically different relatively slow **stable states**, one of which is the age of the ancient great empires, strict class divisions, and constant wars, and the other something either new or just different old?

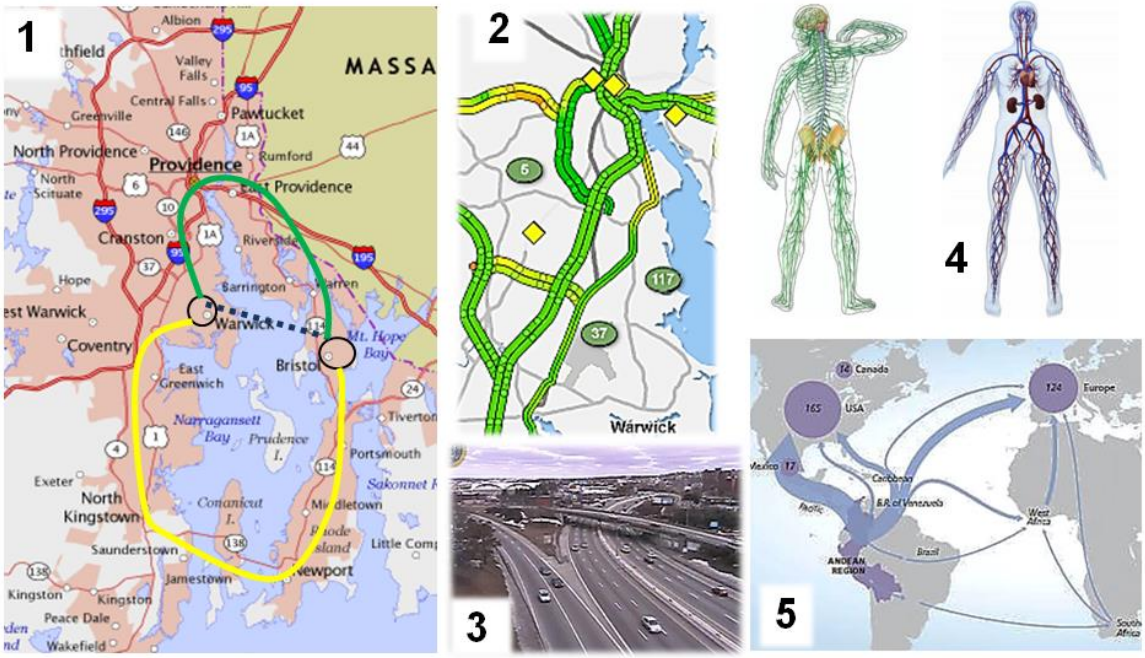


Figure 7. Down-to-earth networks. 1: Distance; 2, 3: function; 4: nervous system and blood circulation; 5. South American cocaine trafficking routes (UN source**)**

I see evolution in terms of points and lines.[28] A combination of points (nodes) and lines (edges) is a graph. Configurations of Pattern Theory are graphs that can behave like real objects representable as graphs. They could follow the laws of conservation and have a preferred

[27] Taking human life as a unit of time.

[28] See Yuri Tarnopolsky and Ulf Grenander, *History as Points and Lines*.

direction of events toward the most probable state, which is the essence of chemistry as paradigm. Distance on graphs can be measured in the number of nodes along an uninterrupted sequence of edges. Most generally, nodes and edges can be attributed any properties, quantitative or qualitative.

To approach the evolution of ecosphere inhabited by humans, Things, and ideas, I start with the oldest networks the HITs—brought to the globe.

> Evolution of transportation of matter, joined by the transportation of ideas, has been one of the driving forces of history. Historically, the first way of communicating a message in a verbal form over a large (beyond horizon) distance was through a human messenger. Therefore, the minimal cost of information transfer was that of moving a human over a terrain, possibly, with challenging topography and various hidden dangers. The emergence of fast long distance communication, destined to run far and fast, is an interesting example of a (topological) revolution rather than evolution. It is still running, transforming the ecosphere, mixing and reshaping matter, ideas, and human ways of life and extending its reach over the solar system.

From the pattern angle, teleportation, still the favorite trick of sci-fi is by all means real and rather cheap. From artificial insemination over a distance to a hacked and stolen US trade secret materialized in China with local minds, hands, and materials and to 3-D printing are the first steps of teleportation, some of them not even too slow.

Figure 7 presents examples of material networks of the most ancient origin: road maps for movement of people (**7.1** to **7.3)**, blood and nervous impulse (**7.4**), and illegal substance for sale (**7.5**). The latter is incomplete because it shows no back routes for money.[29]

The networks are characterized by topology, in which Euclidean distance plays little role.[30] Topology, however, is complemented by functions measured in various ways. For example, the main cocaine supply highway in **Figure 7.5** moves at least about 165 ton of cocaine a **year** to the USA. Digital networks measure throughput in MBps (Megabytes per **second**).

Figure 7.1 shows a map of the State of Rhode Island, USA. As any roadmap, it has a lot of common features with the maps of blood vessels and nerves. Thus, the thickness of a line reflects the throughput of traffic.

Two towns, Warwick and Bristol are separated by the Narragansett Bay so that the actual geographic distance between them is much shorter that along either of the two routes shown by the green and yellow lines. Topologically, both lines and the imaginary connecting bridge across the bay are equivalent. Topographically, the two towns are connected with two very different lines on the road map. In fact, there is a multitude of ways to get from one to the other, all but two of them impractically long and making no sense.

There are many different distinct patterns of topology, some of them illustrated in **Figure 6.7**. The typical topology of New England streets (**Figure 6.8**) is mystifying to somebody from

[29] Although the materiality of money is questionable in our digital era, the drug money moving back home is pure paper without a shadow of the doubt. Its outflow from USA to Mexico counts tens of billions.

[30] There is also such powerful thing as cultural distance. In America it is exemplified by Blue and Red states, as well big towns and rural communities.

Chicago. As for random pattern, it seems to me that nature, all the more, humans, do not produce anything random.
Figures 7.2 and **7.3** show the function, which is, obviously, transportation of matter. In particular, they reflect the lack of congestion in early morning hours.

The topologies of blood circulation and nervous systems are essentially the same while the functions may appear dramatically different: the vessels transport energy and the nerves pass information.[31]

I like the term **topography**, description of the place, which covers all qualitative and quantitative **local** specifics superimposed on topology. The primary concept of topology is neighborhood and topography includes everything about the place, including its neighborhood.

Topology versus topography is like black-and-white line drawing versus color photo. By looking at the topology alone we cannot see the function. Topology is necessary to navigate the colorful jungles of modern knowledge as well as the tangled streets of Old New England. Order betrays a free human intent, while a dash of chaos implies free evolution.

Three pounds of flesh, with its billions of neurons, can hold big chunks of the world. The nervous system of a tiny worm is a far cry of human brain. An army of enthusiasts is working on mapping the human brain, with functional topography and the mouse's brain as an intermediate station on the way from the worm to the man. It became possible with the development of highly sophisticated methods and instruments used previously in medicine and organic chemistry.

> I believe this is the latest great story of scientific exploration comparable with the discovery of America and the structure of DNA. It also promises gold and spices of a kind, and there is no shortage of investment. Will this onslaught on the globe we carry on our shoulders do the same the West did to the indigenous population of the Americas? I would prefer to live on a reservation in the Brave New World. I will be in a good company.

The lines on the pictures like **Figures 6.11** and **6.12** connect not individual neurons but small parcels and modules. There are big expectations, as well as doubts, regarding the level of individual neurons and synapses. I believe that if we fully understand how some simplest and smallest areas work and how form and function makes the next small step toward complexity, the complexity itself will become transparent. The principle of emergence of complexity is: from simple beginning through a sequence of simple steps to complexity. I am not sure if this is correct Latin, but let me try: *Ex simplicibus per simplicem ad complexu.* For mistakes blame Google Translate.

Next I want to note the universality and ubiquity of networks, alternative ways of their representation, and visualization of connectivity.

Let us draw a pathway of similarity between the town streets in **Figure 6.4** to the tiny—1 mm—but illustrious worm Caenorhabditis *elegans* in **Figure 6.9**. It consists

[31] The difference looks exaggerated. Information cannot be transferred without energy and work (form of energy) is not supposed to be performed without a signal, i.e., additional energy.

of 1031 cells (959 for a different form), 302 of which constitute its nervous system. The neurons are topologically similar to houses of a town interconnected with bonds of communication over electronic media, which normally does not fully depend on street topography. Most neighbors can even talk face to face.

I expect **Figures 8** and **9** to save me a lot of words explaining the meaning of points and lines arranged in circles. I will need this kind of visualization to report from the world of **ideas**. Those ethereal creatures have neither mass, nor time, nor terrain, and seem to have no topography. All these points and lines are naked ideas. They can be clothed with substance, however, which is what Pattern Theory is about. They can be a whole world with numbers, weight, color, and struggle, a kind of a live video from the world we live in.

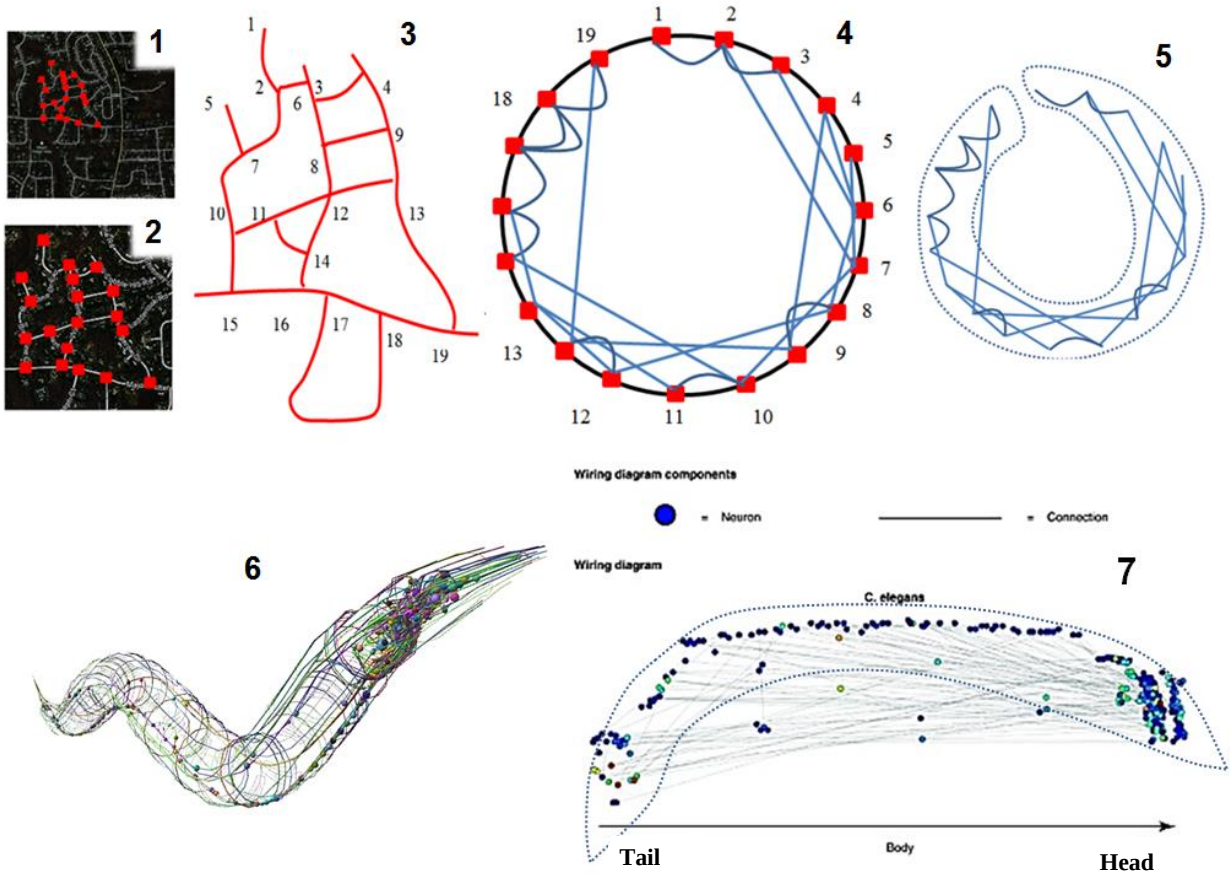


Figure 8. Topology. Upper row: A neighborhood. 1,2, 3: street intersections; 4: intersection connectivity; 5: connectivity reflects distance. Bottom row: Nervous system of *C. elegans*. 6: its topography, source: OpenWorm Project; 7. partial connectome, source: D. S. Bassett and M. S. Gazzaniga, see page 11 of this Essay.

In **Figure 9,** I take a 4 x 4 table as an object of real—on the screen or paper—world, in which each cell is presumed to be connected to its neighbors in rows and columns, but not diagonally. I use two different numerations of cells: orthogonal and radial. For example, cell 1 in

orthogonally enumerated table is connected to cells 2 and 5. With radial numeration, its neighbors are cells 8, 6, 2, and 4. Although both tables are topologically identical, they look visually different.

Square matrix, with each row marking connections of a node in the column, is an alternative way to visualize connectivity. It reveals interesting things when they are enumerated reflecting not only topology but also topography, i.e., spatial order as directly perceived by humans. In Pattern Theory, what I call topography is the **image** to be analytically processed into a **configuration** of a pattern.[32] Image is something all normal humans perceive by senses more or less the same way but may interpret differently, as politics exemplify.

In **Figure 10**, which further illustrates the two alternative ways of representing connectivity, the matrices reveal the regularity masked in the circle form.

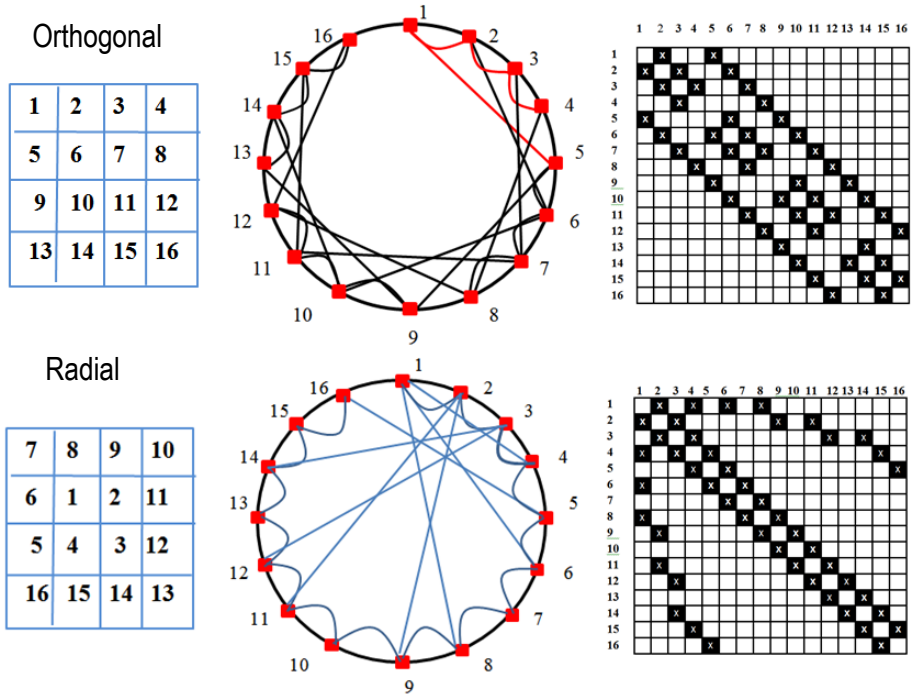


Figure 9 Circular and matrix visualization of the same connectivity at orthogonal and radial numeration of nodes. Cells of a small table are presumed connected with neighbors in columns and rows.

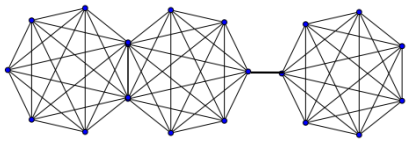
Figures 9 and **10** metaphorically hint at a seemingly irrational importance of the way the same content is presented *ad hominem*. It is a fact recorded in behavioral psychology.

> Ideas enter our mind through our senses. Advertisement in the business—whether of donuts or firearms or politics—depends on this property of an average mind to look into things not deeper than the surface. To

[32] See also my Pattern Chemistry of the Origin of Mind, in particular, its APPENDIX 3.

> look deep into things, as science does, has its cost and we do not pay it unless it promises some return. The borderline between art and science, therefore, runs between the visible and invisible: science is the art of invisible or, more generally, not perceived by senses. The key to the science of Everything, which is trendy to associate with complexity, is to fraternize it with art where we do not look at the back side of a canvas.

There is a particular type connectivity represented by a complete graph, in which each node connects to all other nodes. The "completeness" can be relaxed, so that there will be no nodes separated by more than ***N*** other nodes. This important type of network is known as the "small world" topology.



Small worlds can be connected through a small number of channels, which results in modular connectivity. The three giant "small worlds" are economy, Internet, and human brain. They combine many kinds of connectivity, among them star, modular, hierarchical, etc. I doubt, however, that it is random, although there could be random segments. To prove that something is random, or even that such proof is practically possible, is a problem the solubility of which is also problematic.

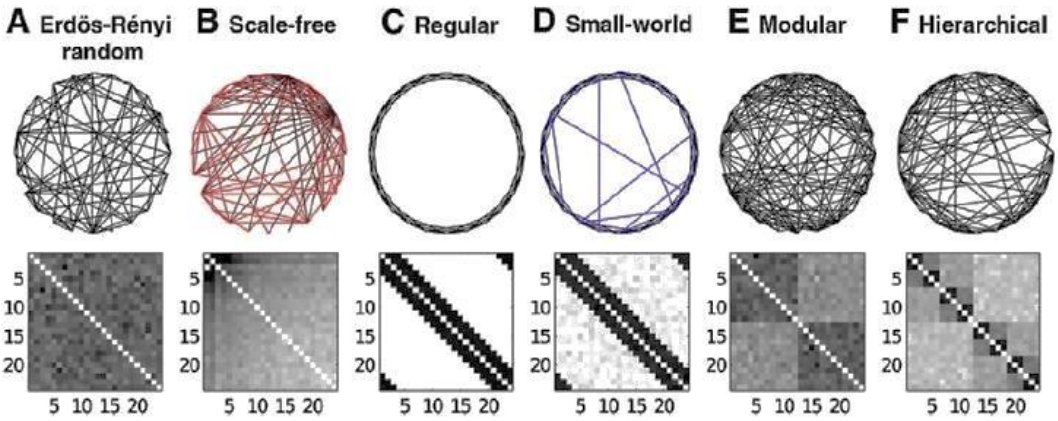
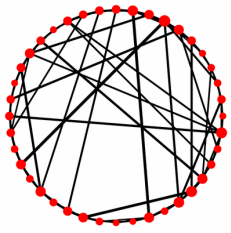


Figure 10. Networks in circular and matrix representation. Degree of black color corresponds to number of connections at the node. Source: Marcus Kaiser, A Tutorial in Connectome Analysis: Topological and Spatial Features of Brain Networks, Figure 6, p.15.



The points and lines of a graph are nothing but ideas: they have no other attributes. Networks are much less ghostly: their nodes and connections have qualitative and quantitative labels or measures, variously visualized. Thus, the intensity of communication can be portrayed by the thickness of a line and the number of connections of a node by its size. Graphs with properties of elements other than topological are known as labeled and weighted, which networks are. Configurations of Pattern Theory are more than that: they have thermodynamic properties. Their generators are similar to atoms, differ in mutual affinities, and they, as well as bonds, can be described in terms of statistical mechanics.

What I want to see in the company with Things and humans is the econation of ideas. It has been always difficult to find a firm ground with these otherworldly products of gray matter. The discovery of information as measurable quantity revealed nothing about its qualitative properties. A chemist, however, is on a sufficiently firm ground with molecules none of which can be seen other than a combination of symbols and connecting lines, with no mathematical formulas attached. We can always manage what we can draw.

4. CIRCLE

In this segment I want to introduce ideas as equals (sort of) into the company of humans and Things. This kind of intimacy is best achieved by arranging the seats in a circle, like in **Figures 8.4** and **9.1.** The circle is a symbol of close relations, not necessarily positive: family circle, circle of friends, or circle of rivals. The links between the members could be different or even non-existing. It is important that people at the round table can address each other with the same physical ease, at least theoretically, in the absence of noise. Yet the number of two-way conversations is limited to half the number of members, assuming that a conversation fully involves two members. Everybody's attention can be focused on one source during a monologue, but it could be also wandering in search of a personal contact, in a competitive atmosphere. The contacts can vary from complete chaos to complete order regulated by the chairman, schedule, or just physical distance.





Thus, 54 out of 55 African states have a round table in the African Union, with rather complex relations between the members. The 193 members of the United Nations are united in the name only. The UN Security Council is physically round, but inherently split horizontally and vertically.

The connectivity of the brain, economy, and world politics is modular.[33] Densely interconnected areas form a sparsely connected network, often hierarchically layered, see **Figure 11**. It is not a round table, but rather a circle or a hierarchy of circles of round tables or ballrooms. Fine details are still scarce for humans, but could be further known for mice.

[33] There is a lot of material on the Web. For example: David Meunier, Renaud Lambiotte and Edward T. Bullmore, Modular and hierarchically modular organization of brain networks Front. Neurosci., 08 December 2010 | doi: 10.3389/fnins.2010.00200. Abstract with a link to pdf. **PDF:** http://www.frontiersin.org/Journal/DownloadFile.ashx?pdf=1&FileId=4837&articleId=7572&Version=1&ContentTypeId=21&FileName=fnins-04-00200.pdf

Regarding economy (modern politics included) this topology is of a relatively recent historical origin. The modern map of Africa is much younger than me. The map of the brain has a much longer history measured in millions of years. It is densely modular anatomically, as well as functionally.

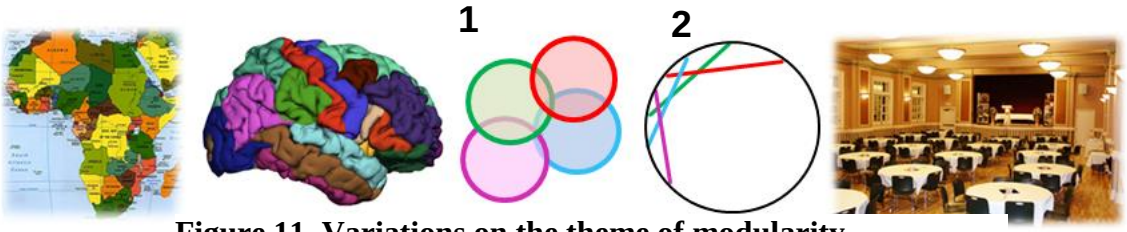


Figure 11. Variations on the theme of modularity.
1 and 2: various compact ways to represent topology of the brain areas

I have a chemical template of the round table pattern: chemical interactions in a solution of chemicals. Although only two particles most probably participate in an interaction—a triple collision is less probable—all molecules behave like any one interacts with any other because of their number and large frequency of collisions. In a macroscopic volume, the process does not depend on the volume. It depends on relative concentrations of reagents—quite like in politics. Situation is different in the solid state, which is more like a prison.

The brain is made of a composite material: it is both solid and liquid. Its powerful connectome works like a solution of chemicals. Instead of multiple collisions of numerous copies, the solid functional parcels (redistricting is possible) communicate by making "phone calls" through the powerful neuronal fiber network. Today, numerous individual minds can conflict and unite through the global network of social media, although it is naïve to believe that we all will benefit from it without paying a price (which we are already paying). Political geography will be influential for a long time, but for how long? This question is all the more intriguing if we, humans, are not alone on the globe: powerful ideas and Things compete with us for the limited but fluctuating resources of fiat money.

Things compete with farmers for land in China today as they did it in England of land enclosures. In Stalin's Russia, **all** land was taken away from farmers in the name of idea and, as some believe, with the help of American tractors. Millions of people lost their lives, property, and freedom.

> 'What is that?' said the Cardinal: 'The increase of pasture,' said I, 'by which your sheep, which are naturally mild, and easily kept in order, may be said now to devour men and unpeople, not only villages, but towns… Thomas Moor, Utopia , 1515.

I reiterate here the main theme of this Essay as a question:

> **If topology of the modern all-encompassing global economy is evolving toward a global network with topology similar (in the sense of Pattern Theory) to that of the brain, what could it mean for the ecosphere and its econations?**

Are the relations between the HITs really close?

To answer this question, any human has only to cast a quick look around. I am surrounded by **Things**, bombarded by **ideas**, most of them about **Things** and **humans**, my books are **Things**, but they are tightly stuffed with **ideas**, and the screens of my computer and TV are spewing what looks like **ideas**, but most of them are about **Things**. With my secluded way of life I rarely see more than one **human** nearby, but the crowds of **Things** are always mixed with the crowds of **humans** whose minds are dominated by **ideas** and images from TV. Moreover, **human** face-to-face and even voice-to-voice communication have been more and more taken over by **Things**. The free flight of fantasy is reduced to menus. **Ideas** are pummeling each other with **humans** paying with their lives for the show, as seen in fragments on flat rectangular **Things** flickering with colors. As for the Things, they die by billions, sometimes living for minutes. Automobiles, computers, and cellphones—sophisticated man-made **Things**—are coming for a one-night, one-week, or one-year stand. **Ideas**, euphemistically called "information," are forgotten the very moment they are perceived, although a few infect millions of minds for decades.

> I am reluctant to use the term information instead of ideas. Why ideas and not info? It is not an easy question because information has a lot of meanings depending on context. Different humans respond to the same ideas differently or not at all. They can also spontaneously generate ideas. Ideas can cause unpredictable actions.
>
> If you believe that you know what information is, for example, in information theory, then idea is the elusive quality of information. As a chemist I can compare idea with a chemical structure: it is a structure built of simpler ideas as a molecule is built of smaller fragments or atoms. It is one of uncountable number of other structures, some still unknown—as a chemical structure is one of uncountable number of other structures, some still not only unknown but even unimaginable. Idea possesses individuality: it makes sense only as a unique one among all the others. What idea does not have—unlike man-made Things—are multiple copies. The concept of idea is inseparable from human evolution: there were a few simple ideas in the beginning and then they started multiplying, growing, and recombining, quite like organisms. It is evolution and not so much DNA, blueprints, and ideas that demonstrate the unity of the ecosphere and its econations.
>
> The problem with idea is that we can define it only with other ideas. This is why I believe that the best way to deal with idea is to drop all definitions and to shape the concept of idea simply by using it, as physics does with energy and work. Idea will be defined not by what it is, but what it is not. It is a node in semantic network, i.e., not the rest of the nodes.
>
> Idea is a human thought that can be expressed in language and transferred to another human.

Being human means producing and consuming Things and ideas. Being alive means consuming and dissipating energy. The evolutionary novelty is the density of the distance and borders defying links between the HITs. The world is topologically shrinking and becoming small.

The most dramatic manifestation of the evolution of topology was for me the triple Islamic terrorist attack on America on September 11, 2001 designed on the other side of the globe in one of the least economically developed spots on earth, driven by an idea, and performed with large

sophisticated flying Things stuffed with, fortunately, not always predictable humans having strong ideas of their own. It makes me substitute the word revolution for evolution.

Another episode of the topological revolution was the US stock market of 2012. It was periodically spooked for a day or two by a few words from Europe and places mostly irrelevant for what was going on in America, but fundamentally important political and economic long term factors did not prevent it from relentless bull chase.

High level personal and corporate information hacked by China and Russia in 2013, "Made in China" as far as the eye can (and cannot) see in America, chopsticks for China "Made in USA," the digital Great Wall of China erect against Western ideas, the idiocy of the American politics, the ongoing war of the Christian Right against Darwin, women, and Enlightening, the hysterical worshipped Apple face into dust like a monument to an overturned dictator—all that tells me that the econations of the world are continuing the history previously—until the Industrial revolution—made by kings and emperors. History is no more driven by individual human will: Things and ideas compete with humans and each other because economy is not only international but also inter-econational.

I would compare the last decade with the Age of Discovery of the 15th and 16th centuries when as result of geographic exploration the whole Western hemisphere was put on the map. The twenty-first century has already brought a re-discovery and mapping of both hemispheres of human brain resulting in pictures like **Figure 6.11** and **6**.**12**. This is a fast developing area.

The explorers of the brain are running into the same problem as the explorers of the globe: mapping. Both have the topology of sphere and cannot be projected onto plane without change in distances and angles. **APPENDIX 2** illustrates the deformations of the maddeningly crumpled cortex during its mapping onto sphere and plane and some spectacular pictures of global connectivity.

Figure 12.1 and **12**.**2** presents two more illustrations. The rest of it offers a hypothetic view of the connectivity between ideas not as semantic networks but as configurations in a dynamic succession, forming and breaking bonds quite like molecule in another ancient spherical vessel: chemical flask.

I have already touched lightly on the relation between mind and brain, which has been heavily handled by philosophers, later joined by computer scientists, from time immemorial. I see the mind as a function of the brain. The function consists of maintaining a population of ideas in a system open to exchange with other minds. If this sounds like the function of an economic unit, n mind and brain, which has been heavily handled by philosophers, later joined by computer scientists, from time immemorial. I see the mind as a function of the brain. The function consists of maintaining a population of ideas in a system open to exchange with other minds. If this sounds like the function of an economic unit, all the better: I see ideas in the metabolism of

modern economy, as well as in the flask of the individual mind.

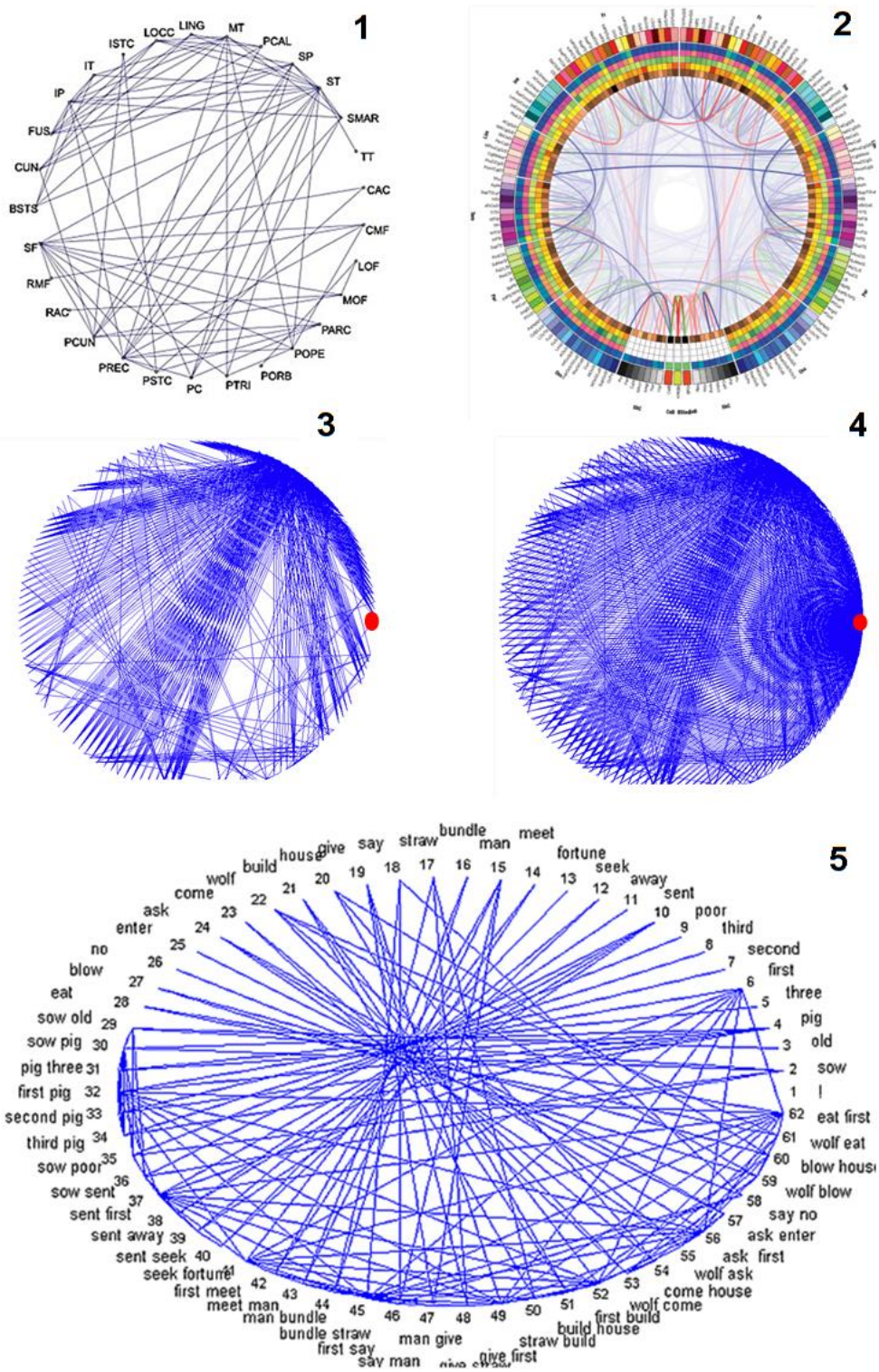


Figure 12. Brain and mind. 1, 2: Connectomes of brain parcels; 3, 4: Development of "connectome" in Ulf Grenander's *Calculus of Ideas*; 5: "Connectome" of the world in the story of *The Three Little Pigs*.

The Pattern Theory of ideas as not just a combinatorial gallery but a process, "Calculus of ideas," has been developed by Ulf Grenander. My version of it is a lightweight modification inspired by fundamental concepts of chemical transformation.

The upper row in **Figure 12** shows the already familiar circles of connectivity, which could be also presented as matrices-like square images. The points on the circle are not individual neurons, but small areas of the brain topography, including functional aspects. The Figures in the middle row are reproduced from **Ulf Grenander, *A Calculus of Ideas: A Mathematical Study of Human Thought,* World Scientific Pub Co Inc., 2012**, Figures 5.4 and 5.5, p.117.

The points on the circle there are elementary ideas (generators) and lines are links between them established during a simulation of a spontaneous thinking, which consists in selecting, along a generated probability distribution, configurations (connected generators) of **regular** ideas. Regularity, very approximately, is what makes ideas meaningful and coherent. The criterion of meaning is, of course, human.

Figures 12.3 and **12.4** are separated by a time interval and the red dot corresponds to the idea SELF, which becomes highly connected. The elementary ideas are placed on the circle, exactly as in the circular presentations of connectivity, but they do neither imply nor exclude interpretation as topographical points on the cortex. This is something we do not yet know. The connecting lines are formed and broken in the process of spontaneous thinking, but in the picture all of them leave a trace. This is why the density of the picture grows.

The system, nicknamed GOLEM, can be opened to an exchange with other similar systems, as well as to the outside world. It is not a piece of Artificial Intelligence, however, but a seed of a concept that points to a different, non-algorithmic direction: intelligence based on random processes, which gets rid of homunculus once and for all.

The lower image is reproduced from my *Pattern Chemistry of Thought and Speech and their Hypothetical Ancestor* . It is the circle of elementary ideas and their doublets, similar to the middle row, taken for the story of *The Three Little Pigs*. The circle, compressed here into ellipse for convenience, is what I call, the WORLD of the story, i.e., the content of a mind thinking about it. The lines connect the adjacent ideas in the linear story. Ideas correspond to nouns and verbs. They are numbered in the order of appearance in the story.

> The difference of my approach is twofold.
>
> (1) I do not pay attention to linguistic regularity of a thought, believing that thought is a pure configuration, not necessarily linear, produced in a universal way by all humans and further **linearized** into a verbal expression in a way depending on the language.
>
> (2) I believe that configurations of thoughts are competing for a limited resource (supply of energy by blood) in a non-linear manner, as in the population dynamics. The patterns of thought that maintain the supply of energy survive natural (trial and error) and artificial (education) selection.

I do not think that the above differences contradict in any way to the main idea of Ulf Grenander's GOLEM: human thinking is probabilistic and consists of random acts from which order emerges. I use the same principle of selection of content and connector from a probability distribution.

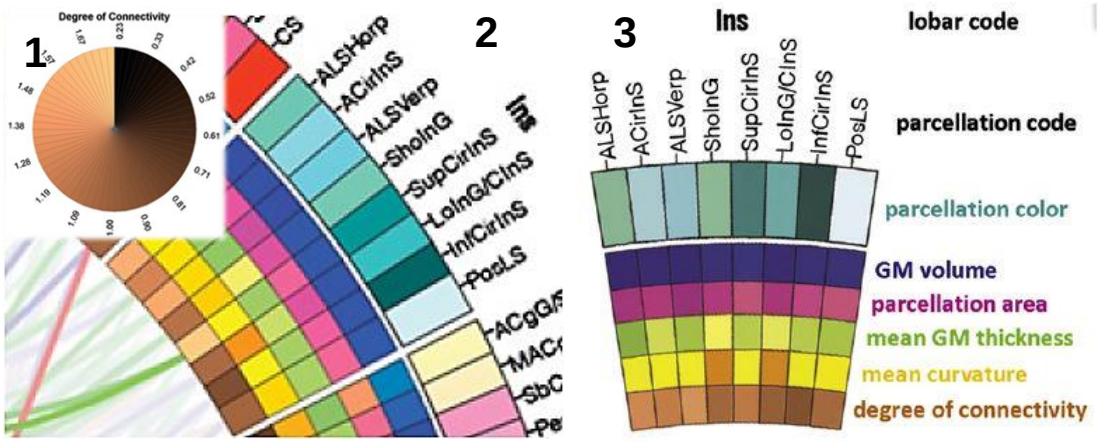


Figure 13. Labeling the topography map of connectome. 1: Color coding of degree of connectivity; 2: Fragment of the map; 3: Labels and codes (Source)

Figure 12.2[34] is for many reasons extraordinary in the context of this Essay: it is the apotheosis of topography. It shows the possibility of circular connectivity as a universal way to enrich abstract topology with many material details. Both nodes and connections can be labeled in many ways, including metric distance, statistics, frequency, whatever.



Insula (red)

Figure 13 illustrates the rich topography of the connectivity map and ways of visualizing it.

The large parts of the brain (lobes) are marked by names (for example, **Tem** is temporal lobe) and their smaller regions by abbreviated labels as well as colors**. For example, Ins means Insular sulcus** and **LoInG/CInS** means **Long insular gyrus and central insular sulcus**. The degree of a property, for example, connectivity, gray matter volume, *etc*., is reflected in the color, and its intensity, of the connecting lines (blue, red, and green). The color intensity also labels the degree of "fractional anisotropy," (how much the shape is close to a fiber and not a sphere) and relative number of fibers in a bundle.

[34] Source: Andrei Irimia , Micah C. Chambers, Carinna M. Torgerson, John D. Van Horn, Circular representation of human cortical networks for subject and population-level connectomic visualization. NeuroImage, Volume 60, Issue 2, 2 April 2012, Pages 1340–1351. http://www.andrei-irimia.com/uploads/2/9/3/8/2938292/028-2012-irimia-connectogram.pdf . **See also this**.

The ecosphere as a whole, the human brain (and any nervous system), ideas, Things, living organisms, Technos, and just any part of land, populated or not, can be represented this way. It is the same that to say that they have something in common. What is it? Obviously, representation. Not so obviously, pattern. Does it mean that anything we can draw or paint or even talk about belongs to the same pattern? Of course, but these questions and answers belong to philosophy, which is little interested in the practical importance of its conclusions, never consensual.

What matters to me is not the universality of representation of different large objects as configurations of Pattern Theory or networks or topographies but the **similarity between the objects themselves**: nations and econations, market economy and ecology, ideas and technology. It is meaningful to me—and here is a dash of art needed for the science of Everything—that they are all parts of global economy. This view is not exactly science, it will not convince everybody, nor change the world, neither will it make new products, nor end conflicts. I consider it a step in the evolution of knowledge. To answer the questions, we need more steps.

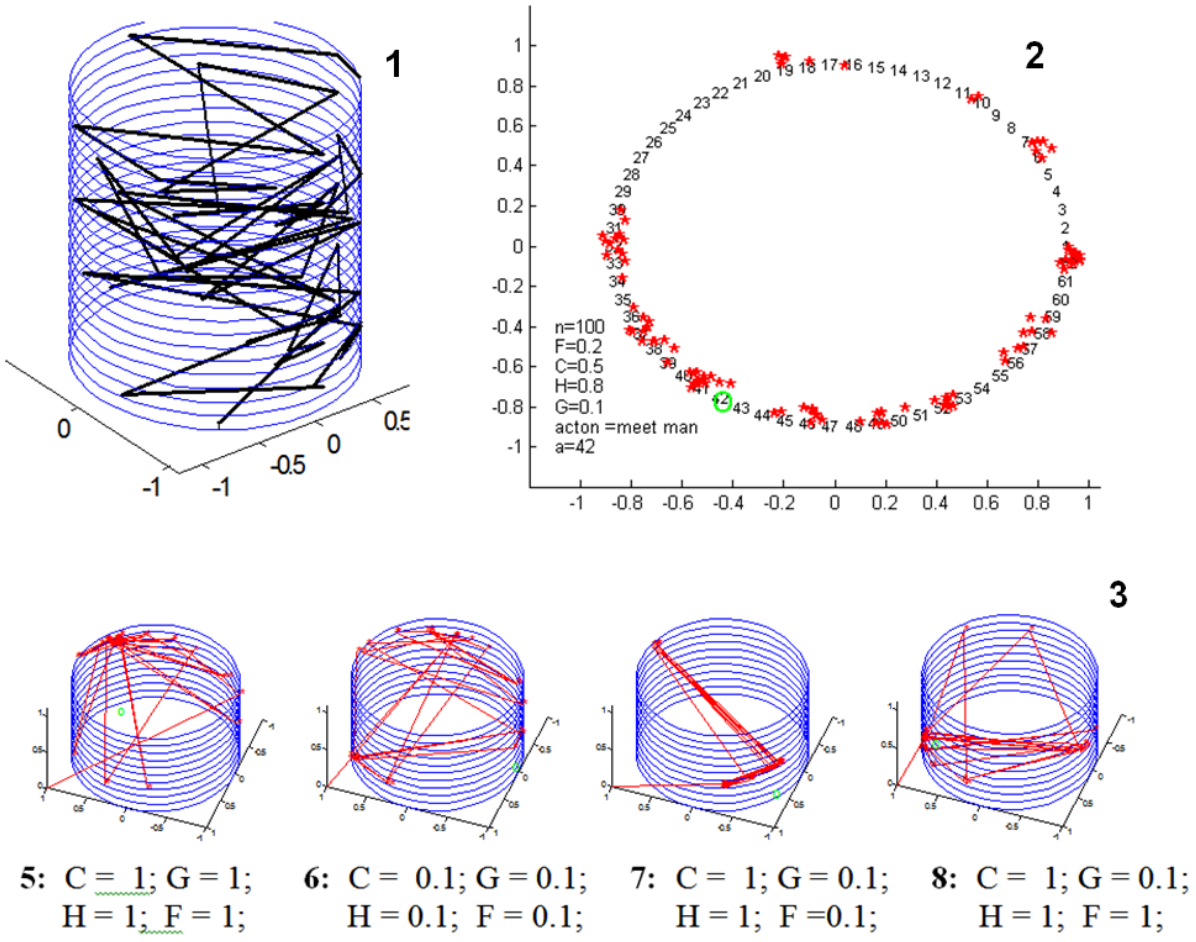


Figure 14. Experiments with *The Three Little Pigs*. 1: An example of time trajectory of thought; 2: Summary retrieval of elements of the story; 3. An example of "world" trajectories of thought with changing global parameters.

Figure 14 visualizes some results of competition between ideas according to a modified very general model of “chemical” reproductive competition first suggested by Manfred Eigen.

Figure 14.1 is a trajectory of consecutive ideas during a spontaneous thinking. The vertical axis is time and the circle in the horizontal plane is the WORLD of **Figure 12.5**.

Figure 14.2 shows the retrievals of ideas (red stars) from the WORLD after 100 iterations. The green circle marks the initial idea, which here is the doublet: MEET MAN.

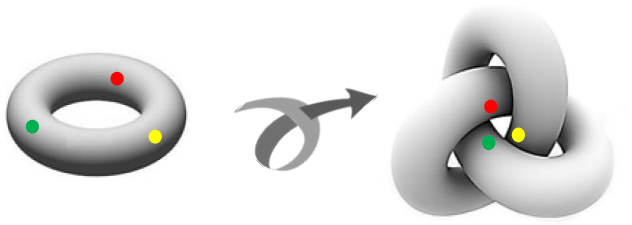
Finally, **Figure 14.3** shows how the result varies with changing four major parameters in the equation of the competition. They characterize such thing as the strength of interaction between ideas, depth of memory, influence of the preceding act of thought, etc. The vertical axis here is not time, but the numeration of points of WORLD, arranged along a spiral. Thus, the difference between the second (14.3.6) and third (14.3.7) pictures can be interpreted as the difference between intensive, jumpy, imaginative “thinking” and a rigid, narrow, constrained one.

5. KNOT

It seems to me that we are currently in a transition state to a distinctly new stage in history of the ecosphere. The indication of transition state in chemistry and pattern chemistry is the onset of instability and a relatively high speed of transformation from one stable state to the next. The "information revolution" moves on with mind-blowing speed. Sometimes the speed is illusory: a novelty is just a variation. Seeing history in terms of points and lines, I am interested in the topological revolution because it could lead us to a better understanding of our habitat and its economy.

I find it difficult to explain in unambiguous terms what is happening with the connectivity of ecosphere. Terms like "small world" topology, connectivity, data, information, and even probability require choosing from a set of available definitions because they depend on the human point of reference. In spite of my difficulties, I have a term for the typically ambiguous "topological revolution:" knotting.

There is nothing exotic in this idea. We hear every day that new Things and new ideas transform our physical and spiritual world. In our everyday media clatter, ideas and Things are like horse and carriage carrying us, the coachman and the passengers, toward a brighter future. Who is the driver if we are passengers?



Knotting. NO MYSTICISM OR LITERALISM, PLEASE!

I hope the illustrations to previous chapters of this Essay already introduced some of my points of reference in the language of gestures, on fingers instead of words. The picture on the left is yet another such gesture to appeal to vision rather than logic. It should not be taken as a mathematical statement. Both sides of the picture have a topology of torus on

which the three color points are distant. The right side, however, although it can be mapped onto the left side and *vice versa* (homeomorphism[35]) shows the three points close in a 3-D space.

My pictures of the knots are not what are called knots in mathematical theory where knots are "circles embedded into 3-D Euclidean space." The knots here are "thickened" knots, i.e., *tori* (*plural* of torus). Alas, with knots nothing is simple. By the way, theory of knots had its beginning in Lord Kelvin's vortex theory of atoms.

The following is an example of knotting, inspired by the massacre of children and faculty at Sandy Hook Elementary School (Newtown, CT), December 14, 2012. However much I dislike any stick-in-the-mud bunch of pious acrimonious opportunists, in no way do I blame the Tea Party for that.

Figure 15 combines three pictures. **Figure 15.1** consists of six visual labels for six interconnected nodes of **Figure 15.2**. They are:

1. The Tea Party movement ("The Tea Party is America").
2. A poster at a right-wing demonstration ("We came unarmed this time").
3. The US Capitol symbolizing the US Legislation.
4. US Constitution.
5. Assault weapon.
6. An American.

In terms of Pattern Theory, they are six **generators** (components, elements) of one of the innumerable sub-configurations of American life, December 2012 – January 2013. The first four are, **in this context**, ideas. The last two are a Thing and a human.

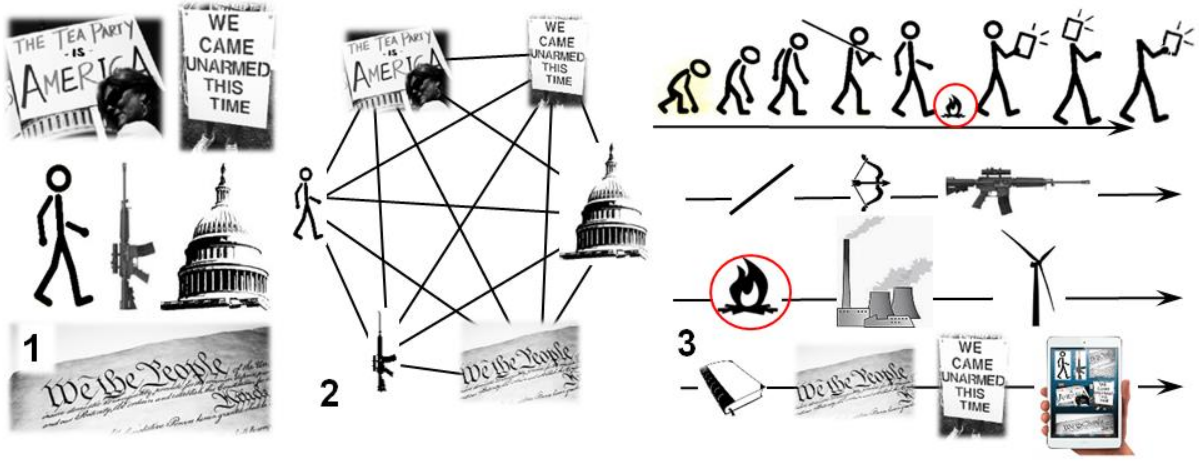


Figure 15: A knot: a small configuration of American life, 2012-2013
1: Generators. 2: Configuration. 3: Evolution of generators; top to bottom: humans, weapons, energy, ideas.

[35] "In the mathematical field of topology, a **homeomorphism** or **topological isomorphism** or **bicontinuous function** is a continuous function between topological spaces that has a continuous inverse function. Homeomorphisms are the isomorphisms in the category of topological spaces—that is, they are the mappings that preserve all the topological properties of a given space." (Wikipedia)

Configuration in Pattern Theory consists of generators and connecting bonds. The bonds between the generators in **Figure 15.2** form a complete graph, so that each generator is connected to all others.

For example, the fate of the murderous firearms in the USA depends on the interpretation of (1) the US Constitution, (2) behavior of US Congress, (3) the anti-government ideas—or pretense—of the Tea Party and its faction on Congress, (4) the perception of the right-wing activists by American public, (5) human nature and the far from equal distribution of its components over the US population and map.

The slogan "We came unarmed this time" is a threat of violence in response to actions of the elected government. "We" there resonates with "We, the People." Similarly, the slogan links to the rest of the components of the knot, US Constitution to Government, Tea Party to human nature and its capacity for anger, hate, intolerance, and violence, Tea Party's "no-matter-what" and "hell, no" frame of mind to political road blocks, etc.

The interests of each of the six members of their respective econations are represented by different organizations and associations, committees, and commissions, some of them of with diametrically opposite views.

Thus, the National Rifle Association (NRA) represents the interests of people, firearms, and related ideas in a package—or knot—which is not easy to undo. The idea in the foundation of NRA and the Congress come from the Constitution. The Congress is elected by the people. The interests of people and the legitimacy of the idea are being debated. Some adherents of Tea Party accompany the debates with threats of violence.[36] Firearms thrive under the wings of NRA and *vice versa*, for which some humans pay with life. Speaking of patterns, to be fair, environment and humans gain under EPA, for which they and Things pay with some loss of space.



Figure 16. The Knot.

In this way all six nodes are connected with each other. Each of the six is a sub-knot of controversies, contradictions, influences, interests, and conflicts in which all three econations are embroiled. Each idea has a material carrier, each Thing comes from an idea, and each human is bound by ideas and aided or harmed with Tings. And everything costs money. This is what I call the modern knot. I reproduce it in **Figure 16** from the figure on the title page. Within the US borders each Thing and every idea are accessible—topologically

[36] Google "tea party" + "we came unarmed this time"

close—to every human and there is practically no geographical distance, no censorship, and little discrimination.

The anthropocentrism of the previous paragraph has a long history, which could be mapped onto evolution of topology from the social structure of a pack of primates through pagan religions, monarchy, monotheism, Renaissance, Enlightenment, and the entire Western history to the unique Serengeti Plain of ideas coming—or returning—from all ends of the world to America.

Figures 15.3 and 17 draw attention to the evolution of each econation. Evolution of ideas is much less known and inviting than general history of humans, but the latter inevitably includes history of technology and ideas as attributes of humans. Ideas and Technos have been regarded attributes of humanity as a whole, also known as (human) civilization, the development of which I have been witnessing for a long time from contrasting points of observation.

The cartoon of human evolution in **Figure 15.1** is a modified promotional bookmark of the *Scientific American* Magazine. The last stage symbolizes a transformation of the book into FaceBook accessed by a tablet computer or smart phone. As the great Stanisław Jerzy Lec wrote, *the window on the world can be covered with a newspaper*: for the lack of a newspaper (R.I.P.), a notebook or a tablet will do the job. As for the face, it has always been able to shield as well as betray the mind.

I am in no way bemoaning the past. For every generation the sun moves across the sky from dawn to dusk and the perception of the world landscape changes with the light. The shadows move, stretch, and shrink.

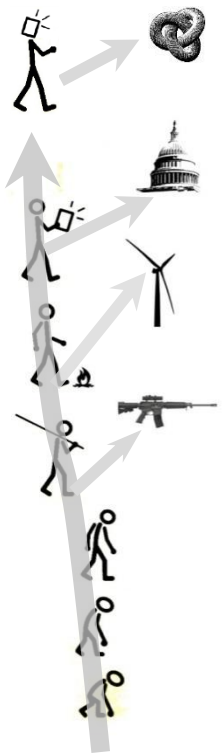


Figure 17. Econations: tree of life.

In the paradigm that I envision, which is not supposed to override the intellectual zoo in any way and is just a view from the pattern angle, humans are in the transition from the control over their ideas and Things to the position of a forced player in a tripartite game with cooperation and competition controlled by the pattern-chemical rules instead of human will.

The rules are more and more constrained by factors out of human control. They are universal rules of evolution as competition for a limited resource (Life sucks!) and **adaptation to its consequences** (Life is good!). In this paradigm, all three econations compete for limited abstract resources, beginning with energy and ending with abstract space, time, and probability.

By space I mean any extensive quality: land, wealth, energy, rare matter, number of dedicated voters, allegiance to an idea, etc. Probability is a kind of a limited resource because the sum of probabilities (if we know the full space of outcomes) is always 1. Not as sharp as mathematical probabilities, but human life time is limited, period.

From pattern-chemical perspective, the three econations are a non-

equilibrium system of species, very different in nature, but much less different as patterns. For example, every Thing, idea, and human is trying to persuade you that it is good for you or somebody else. If a gangster or an Islamist terrorist wants to persuade you that he is bad for you, it is only because he offers you a better choice than to resist. More seriously, all three can be products of economy, have an itemized price tag, and propagate similarly to organic life forms. There is some similarity between a human body with its complex molecular biochemistry, physiology of organs, and the function of the nervous system. All three are drastically different, but tightly knotted.

I included into **Figure 15.3** a line (second from the bottom) symbolizing the evolution of energy sources and, therefore, the entire Technos, from fire to steam and electricity from fuel to renewable energy. Ultimately, it is the energy production—as well as dissipation, i.e., waste—that defines the most radical changes in the evolution of humans, Things, and ideas.

History of the enclosures in England (18th century), the Chinese experiments with limiting human reproduction (since 1979) as well as with explosive growth of Things and massive removal of people from land, the Soviet experiment with limiting Things in human possession (since 1917-1930 to 1990) and their resulting decline, the world-wide constraining effect of Things on human fertility, the possible observable evolution of species as result of climate change—all those large-scale phenomena have not yet been discussed as an inter-eco-national pattern. I have not researched this subject, though.

The ultimate cause of the **knotting** in ecosphere is the evolution of connectivity **from the big world** with landscape, distances, natural obstacles, and man-drawn borders **to the small world**, in which you do not need to send a risky seafaring expedition for the spices of India: they are in a store or available online and delivered to your door, as almost anything else. As a trade-off, if you are in the cross-hairs, your bank account and your intimate thoughts could be open to others without much ado. Moreover, your thoughts can be easily manipulated in the age when Things are rarely accessible to Do-It-Yourself maintenance and are disposable on a grandiose scale.

This is a huge and public topic and I am afraid to be lost in this sink hole, one of many when you deal with Everything.

I realize that granting pattern independence to ideas looks no problem in democracy, but leveling the plane between humans and Things is more questionable in the context of knotting. Ideas are clearly not aliens in the world of Things, however. They have economic value and humans erect the Great Walls of Intellectual Property to protect them from abduction. They dump money into ideas because they expect return. The difference is in the cost of access, transportation, and dissemination.

The decrease of the cost began with writing and has been the latest evolutionary trend since practical implementation of telegraphy after 1850, radio after 1900, and Internet after 1990. The way the giant Google data centers look implies that the cost is far from negligible and grows. I quote:

> "There's no way around it. These things burn a lot of energy, and a lot of the energy in a data center is done to cool it down so the computers don't melt. Data centers in general consume 1.5 percent roughly of all the

world's electricity," Jordan G. Teicher, The Brain of the Beast, NPR, October 17, 2012. See also:James Glanz, Power, Pollution and the Internet.

It is an understandable anthropocentric habit to consider data and Things "belonging" to humans, but to me the opposite equally natural. Humans "belong" to "their" data because the data influence the fate of their human providers. Data "belong" to Things because they store the data. The concept "belong" makes sense only in the context of economic transaction. I see no reason, however, to generalize this relationship over entire econations. I venture into this casuistic area only because I see there yet another argument for the pattern similarity, to put it cautiously, between HITs. **To belong** has a whole spectrum of meanings. The reader can try to sort it all out, but I will stand "my" grounds.

Since the volume of stored ideas of Things, alias **data**, grows exponentially, the data (overwhelmingly junk) will be felt as an energy burden rather sooner than later. Competition of **data** for storage may result in mass culling of data, controlled by some proprietary data and algorithms, quite like mass murder of humans. Will it be possible to predict whose teenage texting, kitten photos, or proprietary data survives and which of Plato's *Dialogs* succumbs when a cloud in the info-skies spills some info-slop down the earth? The past could be rewritten ("refreshed" in the Newspeak) daily, quite like in Orwell's *Nineteen Eighty-Four*.

The pattern kinship of Things and humans is hardly an extravagant idea: they both have mass, volume, can move, and evolve, multiplying from a blueprint: DNA and culture for humans and a digital file for Things. Things need humans, humans need Things. They are no twins, of course. Humans need to consume energy from food, allowing only short interruptions, while Things can be stored for years and even—in museums—for thousands years, although only few of them, like the treasure of Tutankhamen, actually can boast that kind of storage time.

What makes humans different from Things and ideas is mortality. While organic life—mostly water—stays perpetually unstable, i.e., far from equilibrium, Things can be stable and completely solid, although even a laptop contains liquids (sort of) in the battery and display.

Most idle solid Things decay very slowly and their vulnerable parts are replaceable. The problem with Things is that they are completely disposable and not just individually but as a species. Ideas do not care about time: they material carriers do.

Time—daytime or lifetime—is the most strictly limited resource of humans and this is what makes them vulnerable long before the end of life. Things have thousand ways of sequestrating humans from the productive time: in stop-and-go traffic, at the game terminal, in compulsive texting, attempts to understand fine print, years of unemployment, hours of re-learning a new version of Windows. Moreover, the Things have been constantly taking over human occupations and inserting themselves between humans and other Things, as well as within both econations. The previous sentence will be regarded by most readers as a typical metaphor. I am personalizing Things and use "taking over" and "inserting themselves" as patterns. See Essays 15 and 54 on "inserting themselves."

It is a cliché that time is a limited resource. Google: "time as a limited resource" OR "time is a limited resource". *Memento mori*. *Ars longa, vita brevis*. My Essays started with this topic, see Essay 2. Since "time is money" (another cliché), time attracts buyers and burglars.

I want to illustrate the concept of time as a resource in somewhat more than a trite sense. Let us take the hot problem of digital security and compare it with physical security. For ages, the cost of security breach was measured in energy needed to perform work on matter. The Great Wall of China is the best pattern template: it took over a thousand years and enormous work to build and maintain. It takes substantial **energy and time**, more accurately, **work**, i.e., **work per unit of time (power), multiplied by time** to breach the wall at a chosen spot. The same destructive task, even for the most of the wall, could be performed simply by quietly waiting for the forces of nature. Thus, the first stretches of the Great Wall, built before 206 BC, left without repair, are today in ruins. The switch to bricks from earth and stones began in the 14th century AD. We shall visit the Wall after 3600 to see the full effect of the improvement.

A sufficiently long and random password is a typical recommendation regarding personal digital security, I suppose, at least for non-celebrities. In the digital world where pecking on keyboard is the effective equivalent of putting 22 lb. (10 kg) bricks into the Great Wall of China, the creator and the detractor of data have comparable chances. The reason for that is the ongoing dematerialization—and dehumanization—of important aspects of modern human life. As the gunpowder and dynamite had leveled the plane for creating and destruction of stone, dematerialization (=digitalization) leveled the plane for a smart teenager and a team of computer scientists.

The thoughts of Things (i.e., data), can be protected by increasing the time needed for breaking in and stealing or corrupting them. In this role time seems to work as a substitute for physical energy. But it does not mean in any way that time is energy or, for that matter, anything else, from the point of view of physics. It is just the equivalence of small power for long time and big power for short time.

I suggested in **Introduction to Pattern Chemistry**[37] the use of natural scenes and non-electronic channels as a way to materialize the password and make it fit the pattern of the Great Wall.

There could be a way to stop the hand of a hacker. As for ideas, in the land of the Great Wall another experiment has been conducted with walling some ideas off. I remember how much the Voice of America and BBC radio service in Russian had done to destroy my Soviet illusions in spite of jamming.

America is still the open frontier, if not quite for humans[38] then for all Things and all humanitarian, liberal, conservative, hateful, philanthropic, genial, violent, tolerant, and just crazy ideas ever produced not only all over the globe but also over the entire span of human history, with a lot of recent inventions. My comparison of ideas with animals is not an extreme metaphor, but a reference to the pattern of a **life form**, however different from organic life. What is this difference? How big is it?

[37] See **Introduction to Pattern Chemistry**, Part 4, Chapter 8: PATTERN CHEMISTRY OF INFORMATION INSECURITY.

[38] "*Income Growth For Bottom 90 Percent Of Americans Averaged Just $59 Over 4 Decades*" (**Huffington Post**); original source: ***Income Inequality: 1 Inch to 5 Miles*** , by David Cay Johnston.

Literature on the structure of ideas is enormous. It has been built on the foundation laid by Aristotle. Ideas are combinations of basic parts, quite like flowers, computers, bones, DNA, and airport novels. They propagate, populate minds, and evolve by principles of memetics[39] instead of genetics. Politics is the husbandry of ideas counted by heads they inhabit for the lack of their own heads. Ideas mutate, multiply, fuse, and emerge. They are remembered, some of them as stored fossils or reconstructions of mental dinosaurs. Inside the individual mind, ideas compete for the share of time in consciousness where only one few ideas can be present at the same time. Some ideas usurp the minds of their unfortunate hosts and turn them into possessed. Other ideas make

Any omnipotent tyrant dies. Anything of matter decays. Do ideas die? I always denied it. The resurrection of the old imperial ideas in Russia, neo-Nazism in Western Europe, and never-ending fight against Darwin in America confirm that ideas never accept defeat.

When the ideas of pattern chemistry began to solidify in my mind, the most surprising realization was the role of size in the behavior of configurations and patterns. What can be duller than size? I skip repeating the principles (see Introduction to Pattern Chemistry) and limit myself to how it applies to ideas.

Horace: *Odes* III.3

Exegi monumentum aere perennius
Regalique situ pyramidum altius,
Quod non imber edax, non Aquilo impotens
Possit diruere, aut innumerabilis
Annorum series et fuga temporum.
Non omnis moriar multaque pars mei
uitabit Libitinam…

I've raised a monument, more durable than
bronze,
one higher than the Pyramids' royal towers,
that no devouring rain, or fierce northerly gale,
has power to destroy: nor the immeasurable
succession of years, and the swift passage of
time.
I'll not utterly die, but a rich part of me,
will escape Persephone…

Translated by A. S. Kline © 2003

Shakespeare: Sonnets

Sonnet *64*

When I have seen by Time's fell hand defaced
The rich proud cost of outworn buried age;
When sometime lofty towers I see down-razed,
And brass eternal slave to mortal rage;
When I have seen the hungry ocean gain
Advantage on the kingdom of the shore,
And the firm soil win of the watery main,
Increasing store with loss, and loss with store;
When I have seen such interchange of state,
Or state itself confounded to decay…

Sonnet 12

And nothing 'gainst Time's scythe can make
defence
Save breed, to brave him when he takes thee
hence.

Sonnet 60

And nothing stands but for his scythe to mow:
And yet to times in hope my verse shall stand,
Praising thy worth, despite his cruel hand.

[39] Meme, "an idea, behavior, style, or usage that spreads from person to person within a culture" (Merriam-Webster Dictionary) is a great idea—and a widely spread meme—of Richard Dawkins (1976).

While I see humans, Things, and ideas stirred in the cauldron of evolving ecosphere, I try to formulate what is so different and even bizarre about the apparently immaterial information expressible in words and emotions as compared with material Things. Can they somehow escape, as Horace and other poets believed, the steamroll of **time** (the ancient word for entropy), which was incomparably expressed by Shakespeare?

He mentioned two ways to immortality: to breed—whether ideas (verses, following Horace), or progeny, or both, deserving the title of the founder of memetics. And yet Shakespeare still lives, as much because of school indoctrination as in spite of it, while Horace, full of ideas and images that became seeds of Western civilization, seems distantly antique.

There is a particular pattern reason for the immortality of ideas: they can be so small that their self-assembly in a human mind can easily be spontaneous. It is the same pattern as in the emergence of organic life and it applies to Things, too. The apes, our caged and tortured messengers of evolution, supervise the spontaneous emergence of Things from rocks and sticks. In pattern-chemical terms, they play the role of enzymes.

"Life is good," "Life sucks," and "I must change my life" are examples of ideas that arise in human minds without a prompt from a T-shirt or spare tire cover. By a minimal mutation, a lot of things can be substituted for "life" or its description.





Large complex ideas have low probability in Ulf Grenander's *Calculus of Ideas*. Small ideas win competition.

The secret of longevity and invulnerability of ideas is not exactly immortality but the ease of spontaneous generation. There are few degrees of freedom in small systems. Probably, instincts and emotions are the closest precursors of simple ideas. The simplest ideas are just two bonded elementary ones[40] , but the latter also come from somewhere. I am not aware of a systematic work in the field of emergence of ideas but the Pavlovian dog comes to my mind.

Very complex ideas[41] can emerge in the minds of scientists, but they involve with very exotic notions grown in a well processed and enriched soil from other worlds and available only to a few minds. Complex ideas are not fully remembered or even understood by all specialists: they are kept on record in books and files. Of course, complex ideas consist of simpler ones, but the hierarchical pyramid of simpler constituent ideas in science is itself a complex structure, usually built over time in trial-and-error manner. As for the emotional perception of life, the mechanisms of our mind supply the few needed parts for assembly without any conscious effort.

[40] See TIKKI TIKKI TEMBO: The Chemistry of Protolanguage and Pattern Chemistry of Thought and Speech and their Hypothetical Ancestor

[41] For example, Gödel's incompleteness theorem, Andrew Wiles' proof of Fermat's Last Theorem, and modern particle physics.

Simple ideas, especially, prejudices, do not need to be put on paper, let alone a T-shirt. They just keep circulating and spreading over new generations of minds. There is always a hysterical party for every historical time.

As a long time believer in simple reasons, I just cannot resist a short digression.

> What is the true driving force of the American politics in the first decades of the twenty-first century? It must be something really simple because it is so persistent. On the surface, it seems that the American elections are driven only by simplest germ-like ideas capable of spontaneous generation and biting into human emotions like bedbugs. What could that be?
>
> I believe it is the irreconcilable conflict of free market democracy. It is the clash of two incommensurable numbers: wealth of the minority and voting power of the majority. The depletion of the middle class causes the reduction of the buffering center and this is the primary reason of the current Cold Civil War in America. With all the incredible concentration of wealth, the giraffes of Essay 57 cannot overpower the crocodiles because both exist literally in different dimensions, while the US Constitution ignores the difference. To get into the same universe, either the crocks must raise and concentrate a comparable pile of money (which Barak Obama did both times) or the giraffes must whip up the passions of half the crocks, which is possible because of the perpetual contrast between urban and city life. As for the hippos, they are a majority only regarding the intellectual power.
>
> A somewhat similar Hot Civil War comes to my inflamed with patterns mind: the Russian Civil War (1917-1922) between the minority of the upper classes and the majority of the lower classes with a small middle class between them.
>
> This is a dispute not just over apples and oranges but, rather, over pounds and yards.

It would be logically to ask here, what is social justice? Is there anything objective? See **APPENDIX 3**.

Simple ideas are greatly vulnerable to confusion when the context evolves. What can be simpler but more confusing than the Second Amendment? Ideas like that need an interpreter with the mandate of heaven and a deafening voice. The idea is simple:

A well regulated Militia, being necessary to the security of a free State, the right of the people to keep and bear Arms, shall not be infringed.

The idea is simple but its components are context-dependent: *well* (what is "well?" what is "poorly", *regulated* (by whom?) *Militia* (what does it mean today, if anything?), *security* (from what? from whom?), *people* (all human beings?[42]), *Arms* (machinegun? rocket launcher? tank?

[42] "When the country was founded, in most states, only white men with real property (land) or sufficient wealth for taxation were permitted to vote. Freed slaves could vote in four states. Unpropertied white men, women, and all other people of color were denied the franchise. At the time of the American Civil War, most white men were allowed to vote, whether or not they owned property." (Wikipedia). See also A , B, and C ("…repel invasions, suppress insurrections, or execute the laws").

chemical weapons?), *infringed* (how does it go with a good regulation?). Now, *being necessary*: does it mean ***in case*** *it is necessary* or is it *always necessary*?

Simple ideas are simple at birth and in simple times. Tied in a knot with Things and humans, pulsating with the circulating money, they can be hopelessly complex.

We are surrounded and overcome by Things. They penetrate our physical, physiological, psychological, and cultural space. They are inside our bodies (pacers, stents, and joints) and in the air (the newest micro-drones[43] that will soon be disposable flying assassins peeping into our windows and hiding under the bed). Ideas are still visible on pages and monitors and heard on the radio. If we can move prosthetic hands and legs by our thoughts, sooner or later something will wedge in between our brain and somebody else's and will gently whisper that whatever evolution brings us is for the better.

What makes each citizen of an econation surrounded by other nationals as by masked doctors with sharp instruments? Why aren't humans bothered by the visions of millions smartphones killed in the prime of life and bulldozed into ditches like cadavers in an extermination camp? Aren't we afraid of the revenge of the Things whom we have given the gift of ideas deceitfully called data and algorithms? Will the ideas of freedom, human rights, and pursuit of happiness win a competition with ideas of submission to Heavens, class inequality, strong hand, predestination, and order no-matter-what? There must be some universal physics in the ecosphere that determines the preferred direction of events as well as the impossible one. If we create millions of ideas and Things, what will counterbalance the creation by destruction?

What is the place of humans in the future? We are the slowest evolving econation on earth, unless prodded by Things and ideas. Can we compete with the fertility of Mother Apple Inc?

> "There have been six generations of iPhone (original iPhone, iPhone 3G, iPhone 3GS, iPhone 4, iPhone 4S and iPhone 5), five of iPod Touch (1st to 5th generations), and four of iPad (iPad (1st generation), iPad 2, iPad (3rd generation) and iPad (4th generation))." (Wikipedia)

Those would be idle questions if we did not know well that the future has already started yesterday.

The power that ties everything into a single knot of economy is money: the now universal form of energy in the ecosphere that circulates inside the triple knot of economy, coming from sunlight, mineral fuel, and planetary rotation and dissipating with heat, garbage, and carbon dioxide. Things and ideas that used to comply with human preferences, however silly sometimes, may also warn us one day with something like "We came unarmed this time."

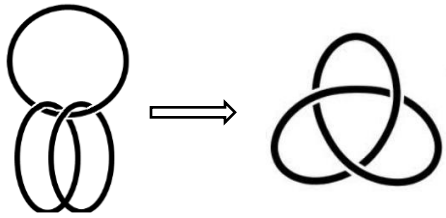
Indeed, money, formerly cattle, gold, and paper, has become an idea in a digital body.

Without even following the laws of conservation, it keeps the ecosphere together. It makes everything close: hand of the thief and your pocket, healing power of a new medicine and its

[43] See: D, E, F.

crippling side effects, war and humanitarian aid, striving business and unemployment, assault weapons and school children, freedom of imagination and “press 4” of an automated responder, and only wealth and poverty stay worlds apart. In a bout of nostalgia, the idea materializes back into the pickled cattle of Damian Hirst and finds a buyer.

I am not an expert, but it seems to me that throughout its history America never went back to the past. It is quite possible that the enormous concentration, ubiquity, and fluidity of money are the main reason for the plasticity and dynamism of American society. It is moving ahead. The question is: what is there ahead for America and the world? I ask this question not because I want to stop it or suggest engaging any breaks. As a fatalist, I believe in adaptation—the steering wheel—not the breaks. If we formulate a question about the future, we will get a chance to complete an experiment with history which, unlike experiments on particle physics, will not cost us anything: time alone will do the job and bring us to the answer. Patience is the humming time machine. But we have to ask the right questions now and remember them later.



6. *ERGO…*

Suppose the idea of the ecosphere as competitive cohabitation of econations is sufficiently productive to be saved of immediate brushing off. The following conclusion seems to be in pattern spirit.

A species survives if it is productive, i.e., fertile.

Idea survives if it is productive in:

(1) generating new ideas,
(2) linking—positively or negatively—to old ones,
(3) spreading over large number of minds
(4) materializing in many Things.

A Thing survives if it is productive in:

(1) generating copies of itself,
(2) generating its mutants, hybrids, symbionts, hosts, and parasites,
(3) bonding with a good idea.

Do I really need to continue with humans?

I believe that the similarity of all three econations is clearly visible from the above comparison. In an ecosphere with limited space, resources, and population, all three econations will coevolve, driven by inherent ability to reproduce and propagate.

I have not mentioned money as a universal measure of energy, a kind of a universal ATP of the ecosphere. Will money shift to the form of a Thing (coin, paper), idea (number, future number, number as a goal), or raw human life, freedom, health, and even body part, as in some extreme ancient and modern ultra-religious, oppressive and genocidal trends?

Let us look at any detailed map of a piece of land, for example, **Figure 7.1**. Before the advent of man, it probably had only animal trails. Then pathways for humans and their animals appeared. Private land is closed to strangers. Modern highways are closed not only to pedestrians but also to vehicles between the entry and exit ramps. Moving around is constrained: it is physically easier, but has less degrees of freedom than in the age of walking and horse riding.

If we look at the map of the brain connectivity, like in **Figure 6.12**, we can see established pathways and highways of the brain paved with bundles of white matter. To compare with the communication on earth, those are underground cables, sometimes through the center of the earth or under the sea.

Like the earth, brain has two very big continuous cortical landmasses—Americas and Afro-Eurasia of the hemispheres—and the Australia of the cerebellum. It also has lots of smaller island formations deeper down. The modules are connected with interstate highways and smaller roadways between modules and parcels of the cortex that can be compared to neighborhoods.

Something like that could be a possible **pattern destiny** of the globe[44]: loss of freedom, fast track for a few options, more irregularity and less individuality. It could be survival of the similar, unremarkable, and run of the mill, as w ell as depletion of the surprising and unexpected, in short, the minimization and stabilization of the repertoire of patterns in ecosphere, even shorter: **freezing.**

The structure of human brain has been frozen for as long as we remember ourselves, although for a historically short time. Similarly, the evolutionary fluidity of the ecosphere could be freezing into a tight quasi-mechanical system similar of a large company with a very large number of customers, like Verizon, Amazon, Google, FaceBook, etc. How this GlobalMind Inc could be governed is an intriguing question, not to be considered here.

There is another configuration of the pattern of freezing: learning. Riding bicycle, speaking foreign language, or making money out of thin air on the stock market begins with lots of trial and error, exploration, missteps, playfulness, and final stabilization of the routine with some frozen errors hard to rid of. Evolutionary adaptation, however, is constant learning of changing languages, vehicles, and economic idiosyncrasies.

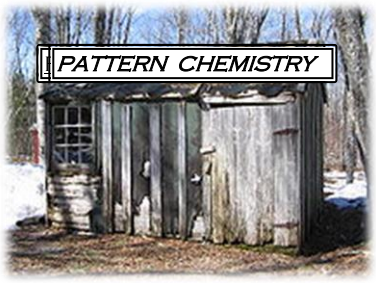
If there is a single ecosphere instead of a population, how can it adapt? This question is equivalent to the following: why is history accelerating, so that a single generation can witness dramatic changes? There are two possible answers: (1) the changes are not as dramatic as they seem, especially, as patterns and (2) the emergence, mutation, and selection of ideas is incomparably faster than selection of genomes.

The main argument for the idea of the ecosphere of HITs depicted in this Essay is that it is already there in the form of global economy. I leave to the reader to look at the economy from

[44] On verticalization of social structure, start with **Introduction to Pattern chemistry, Part 1, 3.11.** ***Hats and roofs, lizards and dinosaurs*** and in subsequent text.

this angle, paying attention to how the process of globalization interacts with national and econational systems. A curious example is the hate of the West by the militant Islamism and the hate of the Socialist and Rationalist West by the militant Right Wing.

I do not have a coherent vision of the future, all the more, answers to my questions. The distant future is not really important. As for the near future, which already has put a foot in the door, the following questions are most solemn: (1) the fate of the political system in the USA, i.e., the dilemma which I defined as “from two parties to one there is only one step,” (2) the outcome of the competition between authoritarian (China, Russia) and democratic (USA, Europe) capitalism, (3) the potential of turning economic inequality into class warfare, and (4) whether the current explosive digitalization of all aspects of life is just a transition state between long slow centuries of the past and the long slow centuries of the future explored in details by historians and Sci-Fi writers with the globe on their shoulders.



APPENDIX

1. Pattern Theory and pattern chemistry

ESSAYS

Essays 1 to 58 (2001-2009) were previously published at:

http://spirospero.net/simplicity.html See APPENDIX 1 for full contents.

Essays 1 to 56 http://spirospero.net/essays-complete.pdf
Essays 1 to 20 http://www.scribd.com/doc/11607864/Essays-Part-1
Essays 21 to 40 http://www.scribd.com/doc/12273800/Essays-Part-2
Essays 41 to 56 http://www.scribd.com/doc/12529842/Essays-Part-3
Essays 1 to 56 , pdf http://www.scribd.com/doc/17164855/Essays-a-la-Montaigne-complete

Essay 57. THE FEW AND THE MANY **, 2012** (html)
Essay 58. PATTERN CHEMISTRY OF RATIONALITY. ALL RATIONAL MINDS ARE ALIKE; EACH IRRATIONAL MIND IS RATIONAL IN ITS OWN WAY 2012

PATTERN THEORY

Ulf Grenander, *General Pattern Theory: A Mathematical Study of Regular Structures*, Oxford University Press, 1994.

Ulf Grenander, *Elements of Pattern Theory*, The Johns Hopkins University Press, 1996.

Ulf Grenander, *A Calculus of Ideas: A Mathematical Study of Human Thought,* World Scientific Pub Co Inc. , 2012.

Numerous sites on the Web.

PATTERN CHEMISTRY

Yuri Tarnopolsky, COMPLEXITY, http://spirospero.net/complexity.html
In particular:

Molecules and Thoughts: Pattern Complexity and Evolution in Chemical Systems and the Mind
The Three Little Pigs : Chemistry of language acquisition
TIKKI TIKKI TEMBO: The Chemistry of Protolanguage
Pattern Chemistry of Thought and Speech and their Hypothetical Ancestor

2. Mapping

Figure 18 illustrates two strategies of mapping the brain with preservation of topology. **Figure 18.1** shows the stages of "inflation" of the crumpled sphere of the cortex to a 3-D shape similar to the globe. **Figure 18.2** shows the stages of flattening the 3-D cortex into a 2-D map.

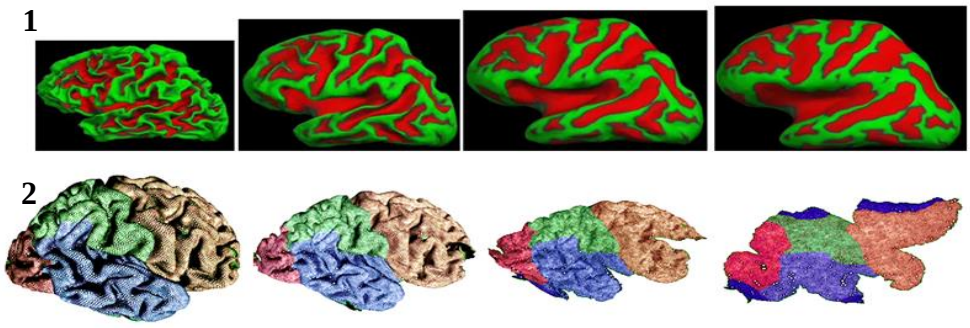
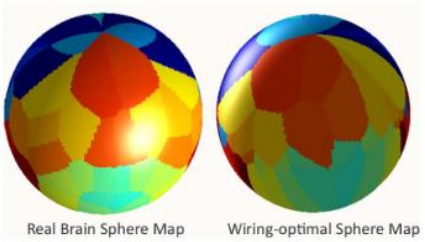


Figure 18. Homeomorphic mapping of the brain.
1. Inflation; 2. Flattening.

SOURCE

Figure 18.1: Frames from a movie in: Florent Segonne**,** A Short Introduction to Topology in Image Processing .
Figure 18.2: Frames from a movie in: Monica K. Hurdal, Visualizing Flat Maps of the Human Brain .

Figure 19 adds three more illustrations of small world connectivity sharing the modularity pattern with brain: world airline routes, internet, and all kinds of land, sea, and air transportation.



The circular representation of the world connectivity would look like a 3-D globe with its "white matter" of bonds filling the internal space. This is not easy to show on 2-D plane. Nevertheless, it was found,[45] that if the brain is mapped on the sphere, its connectivity is very close to maximal economy of wiring. I reproduce here the real brain sphere map and "wiring-optimal" sphere map from the same (open) source.

[45] Ashish Raj and Yu-hsien Chen**, The Wiring Economy Principle: Connectivity Determines Anatomy in the Human Brain**, PLoS ONE (2011).

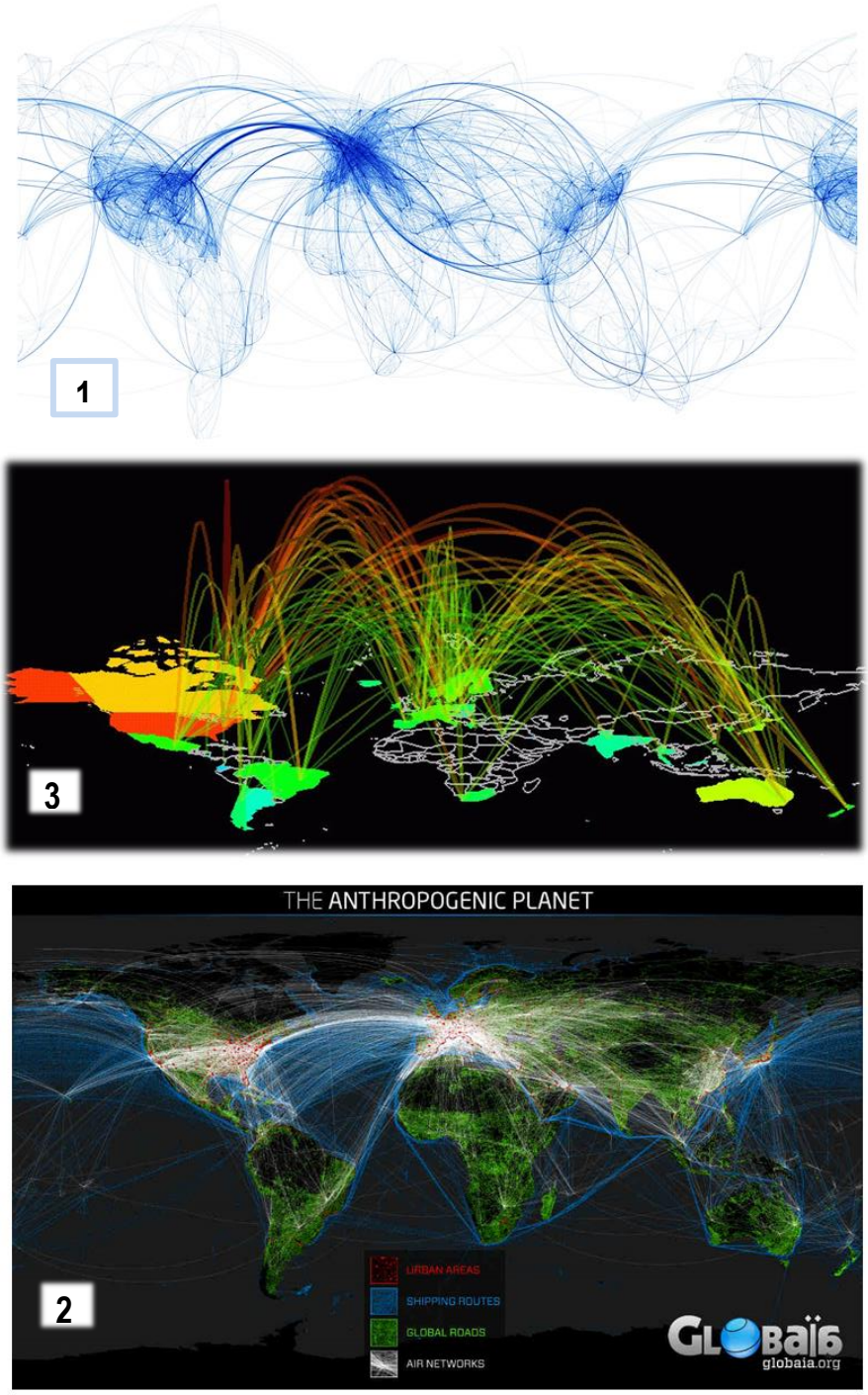


Figure 19. World connectivity.
1. Airlines**. 2.** Internet**. 3.** Land, see, and air transportation **.**

3. Marxiumum and social justice

This **APPENDIX** continues **Essay 57**, **THE FEW AND THE MANY: Pattern chemistry of 2012 Elections**[46]. In Essay 57, I discussed a particular boomerang-like angular shape of the income distribution curve revealing the income chasm between two classes none of which could be called middle. The middle finger to the middle class.

I am looking for a simple measure or indicator of social justice. This is the area where the lack of consensus is quite natural as in all disputes about something non-existing. The last decades have pushed income inequality in America to a striking and, as some believe, dangerous, even worse, irreversible degree. At the same time, there is a consensus that inequality is natural for capitalist society. I agree with all that. I would add that equality, even if not complete, is unnatural for any society, even the one without capitalism and private property, in which I was born. And yet from all I know about societies I was not born into, **extreme** inequality of any kind—of wealth, power, social status, representation, rights, and duties—is synonymous with instability. This is why history exists and keeps bringing surprises.

Two famous revolutions—in France and later in Russia happened in societies with high inequality in land distribution. Peasants were the overwhelming majority of population in both countries. In France by the end of the 18th century 3% of population owned 35% of all land and paid no taxes (the sweetest dream of the US Republicans). To add insult to injury, bourgeoisie (8%) owned 20-25% of land but had no political representation. The insult could be more painful than injury: bourgeoisie, rather well off, ran the revolution and redistributed the land. In Russia, about 100 years later, 1.5% of people owned 25% of land. The 100 years after the French Revolution had not been wasted: the Bolsheviks who did not represent anybody but the specter of Karl Marx, surfed the wave toward a complete political repression of bourgeoisie as the first step, its annihilation as class next, and the **sequestration** (a US Republican obsession of 2013) of all land afterwards.

I believe the following idea is original, but I have not searched the literature.

I want to draw a borderline between two types of social (i.e. economic, as everything today) justice so simple that it would be not so easy to dispute. It would be completely up to the observer which type to call justice and which injustice. Difference is all that matters.

[46] HTML version

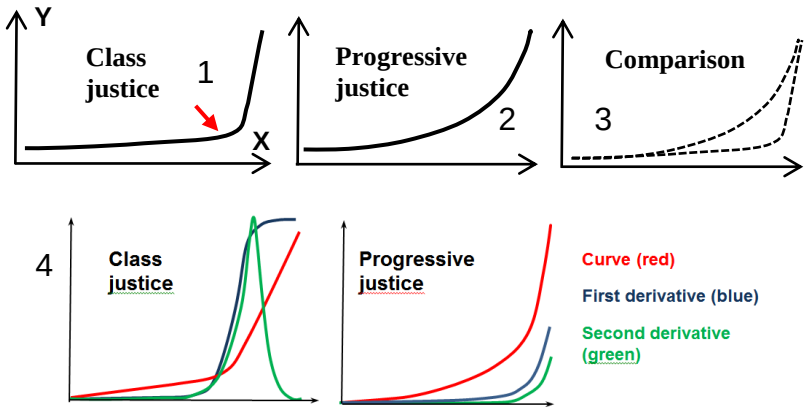
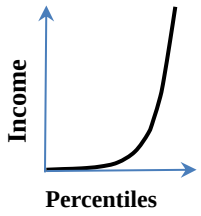


Figure 20. Social justice in terms of wealth distribution. 1– 3: Wealth (Y) plotted against population percentiles (X). 4: Second derivative as test for a social class division.

The upper row of **Figure 20** presents two types of justice/injustice. I call them class justice and progressive justice. In fact, it is nothing but two income distributions. They are fictional and not based on any real data.

The income distribution for class justice has the boomerang shape: a visible and abrupt change of the income growth. The transition from one social class to the other is relatively sharp. It looks like the two classes are separated by a barrier and obey different laws of nature. Even a superficial observation, not to mention the recent bumper crop of works on inequality, confirms the striking difference in all aspects of lifestyles.

The progressive distribution is smooth: there is no part of the curve that looks special. It is close to the shape of the exponential function $y = a^x$. It grows rather steeply from percentile to percentile. This is the famous (or infamous) exponential growth, a very divisive notion.



In practical terms, my only requirement to the progressive justice curve is that the income should grow more or less with the same acceleration. In terms of a mix of differential calculus with a movement of a vehicle, the first derivative of the income distribution characterizes the speed at a certain point and the second derivative gives the acceleration. For exponential growth, the function and both derivatives **have the same shape**.

I am neither mathematician, nor economist, biologist, nor physicist. My platform is pattern chemistry. Patterns are about similarity. I can afford looking as frivolous with serious scientists as poets with serious businessmen. Thus, I consider the mobility of a vehicle and the social mobility along the percentiles **similar.** In this sense I am talking about speed and acceleration. It is natural to measure social mobility in income (or wealth) increase per percentile. If there are one hundred social classes in a society, there could be quite easy to notch up a percentile: such a small step for a man. However, if there are only three, as it was in pre-revolutionary France, or…

by the way, how many are there classes in America? Certainly not less than two: enough wings for a boomerang.

Figure 20-4 shows how would the first and second derivatives look for two types of artificial income distribution curves. If there is a singular increase of the speed of social mobility, a noticeable acceleration, then the second derivative would have a maximum. I have an irresistible term for this maximum: **marximum,** to honor Karl Marx who was obsessed with class conflicts, probably, for a good reason, the future will show.

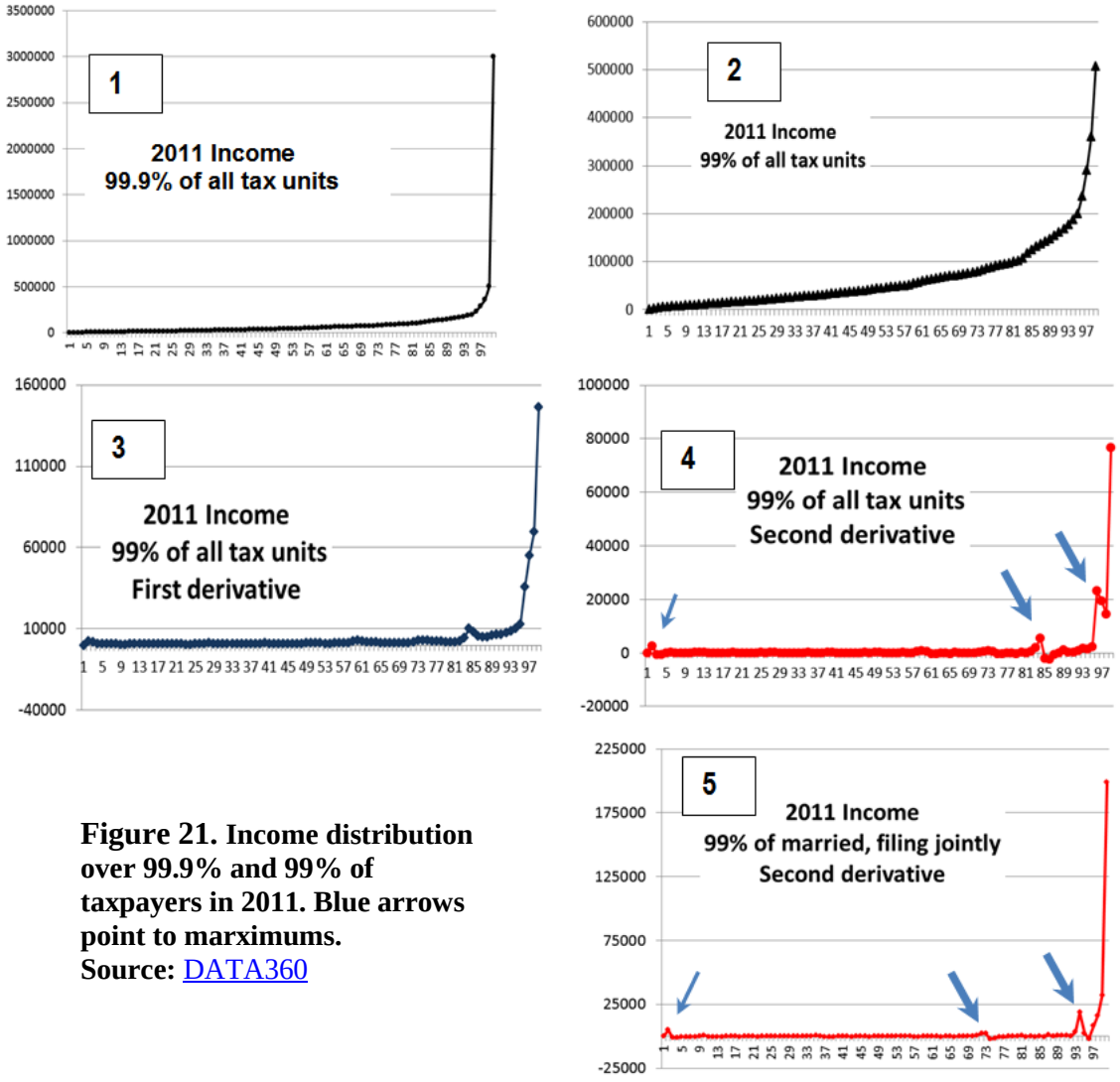


Figure 21. Income distribution over 99.9% and 99% of taxpayers in 2011. Blue arrows point to marximums.
Source: DATA360

I describe the society with progressive justice as the **equal inequality**: the laws of inequality are equal for all. Wherever you are on the inequality curve, your next step will increase your income by the same coefficient. In other words, if your social mobility is described in terms of speed and acceleration, your speed will increase with acceleration which is more or less the same

along the road. The boomerang, however, shows that something happens at a certain point and you jump from an automobile to a supersonic jet accelerating to the space rocket speed. Very few people manage to stay in touch with the earth after that. True, very few people reach that point.

Let us now search for the marximum in the real world h income distribution statistics for 2011. The data are available at DATA360 , and could be accessed by search for "income," which leads to the table Income Percentiles 2011 (http://www.data360.org/pub_dp_report.aspx?Data_Plot_Id=824&count=all). Note, that they are based on tax data. The billionaire Warren Buffett famously reminded the people about the enormous gap between wealth and income taxation: he paid less taxes than his secretary. And yet the tax data show the "boomerang effect," which is, depending on your character, either inspiring or intimidating.

In **Figure 21,** I plot the percentile distributions and their "derivatives." If 99.9% of taxpayers are included in the data, the boomerang effect is awesome. In the ecosphere it is like Mount Everest, or great white shark, Albert Einstein, the US Constitution, or the Large Hadron Collider, but not all of that together.

What I call derivatives are approximations by differences from percentile to percentile. Mathematical derivative[47], *dy/dx*, is, roughly, the difference of two *y* for two infinitely close *x*.

The top 1% is a difficult area where income hides in the shade of wealth. For fun rather than fact, I plot in **Figure 22** the **wealth** distribution within the Forbs 400 luminaries (September 2012).

Not surprisingly (for a power law distribution), it looks like a boomerang and shows the same high inequality. The Few are quite like the rest of us. Also, not surprisingly, it does not look like unjust. The small community of giants play by the same rules of human nature, are driven by the same ambitions, and tormented by the same inner demons, only of Godzilla size.

The nervous tremor of the area between the wings of the boomerang on **Figure 22** (red circle) is probably the result of the non-uniformity of the *x*-axis, which is not fraction but ranking.

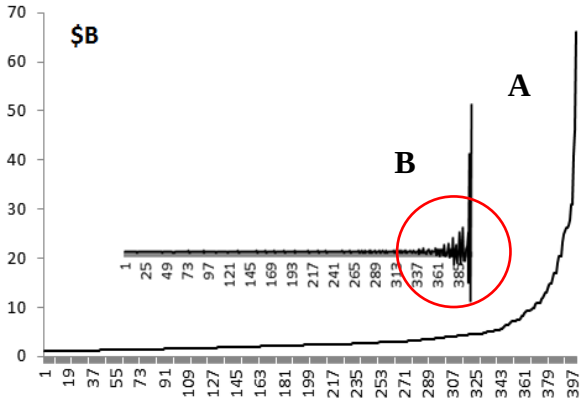


Figure 22. Wealth distribution (A) and its "second derivative" (B) based on Forbs 400 , September 2012.

[47] "In calculus, a branch of mathematics, the **derivative** is a measure of how a function changes as its input changes. Loosely speaking, a derivative can be thought of as how much one quantity is changing in response to changes in some other quantity; for example, the derivative of the position of a moving object with respect to time is the object's instantaneous velocity. "(Wikipedia)

When I exclude the top 1% from the data, as in **Figure 21.2**, it looks like my ideal of social justice has been realized in America. Still, the second derivatives show two marximums and a tiny one in the very beginning of the Via Rosa to the 400 Club. They are certainly not large.



The origin and meaning of the multiple marximums is beyond my scope of interests and should be left to professionals.[48] It could be just an effect of the Byzantine tax laws in America, the high cost of college education, the self-perpetuation of educated elites, or other reasons.

I tie this esoteric subject to ecosphere because I see here a poetic episode of the evolution of the HITs.

Here the pattern-chemical story. One of the most ancient forms of money has survived to modern times in tribal societies and it was unlike any other form: cattle. It could grow and multiply on land and in human hands. So could grain, another ancient currency. Moreover, the Things and ideas have also diversified the genealogy of money. In pattern parlance, money had split from life as another pattern life form and remains a life form today, although the strangest one. Money is a real child of ecosphere and a genealogical cocktail, combining the patterns of life, Things, and ideas, and, yes, humans, although only as images on coins and banknotes. And how could I forget gold and silver, the minerals? Below is the gallery of money's ancestors, although I find it difficult to visualize the digital money. Instead, I give a link to its various images:
https://www.google.com/search?q=bitcoin&hl=en&client=firefox-a&hs=uNO&rls=org.mozilla:en-US:official&source=lnms&tbm=isch&sa=X&ei=6yJcUfCOL42y0QGDyIDoCQ&ved=0CAoQ_AUoAQ&biw=1474&bih=807



The fourth from left is the now extinct but fondly remembered the 10 Deutschmark Banknote with all three HITs: (1) the image of Karl Friedrich Gauss (1777-1855), one of the greatest scientists ever lived, (2) his best known idea of normal distribution (the "bell curve"), and (3) on the back side, heliotrope, his invention used in land surveys which he conducted in his younger years.

Money could be farmed quite like cattle and grain. Both obey an ultra-sharp Gauss distribution (i.e., physical uniformity) in their materializations as cash, but otherwise in the world of money the normal distribution is powerless. It is the power law that rules and inequality that is normal.

[48] The marximums have a very abstract physical prototype: phase transitions.

The Few (the giraffes of Essay 57) are the class in possession of highly productive, actually, industrial means of money breeding. The better-offs among the Many (the crocodiles well above the water) stop short of the ownership in money industry but still can rent some of the slower and more regulated money farms.[49] Depletion of either species is perilous for society as a whole.

This is a separate and infinitely large subject, however. Capitalist democracy and, especially, the American democracy, is so historically new and the pace of history has been so much accelerating that people still do not quite know all habits and whims of this political order and what to expect of it. I have already got used to its paradoxes and to the most puzzling one: the pious Reds call for revolution and austerity while the Blues tacitly follow the steps of Jesus.

In the very long run, pendulum-like swings between democracy and autocracy are as natural as the change of seasons. Note that pendulum moves the slowest around its extreme points and sweeps fast through its middle position. So does history: from long historical "left" to long historical "right" and back through short fast transitions of wars, revolutions, depressions, recessions, and reforms.

I do not think, however, that the current political tension in America is a class conflict. **Figure 21.2** is still peaceful. The Red-Blue divide could be just a farewell to another handful of ossified marximums. I am optimistic because the conservatives seem to be intellectually in all respects lower than the progressives. As my father-in-law used to say, you cannot shop for what you lack in your head.

As for myself, living in these exciting times, I am less and less inclined to grumble about the Cold Civil War and begin, cautiously, to believe in the possibility of a Cold Civil Peace in America. If a not-snow-white candidate or a woman becomes president, if gay marriage accepted, if the right to die wins, maybe even the atheists will be removed from the category of social lepers and the separation of church and state, now shaken, will be restored.

The pendulum of history is whooshing back and forth, the hands of the clock come full circle, but time runs only forward. It is measured not in days but in generations. I can't believe I am saying that!

2013

[49] In entertainment industry the concentration of wealth follows the concentration of fame. The fame farming is the very basis of modern art and entertainment. Steve Jobs had put his Apple on that path, but fame…"*e mobile/ qual piuma al vento,/ muta d'accento/ e di pensiero*." [Woman] is unstable like a feather in the wind; she changes her tone and her mind.

ESSAY 60. ART AND NEXISTENCE

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http://spirospero.net/simplicity.html (contents and links to single Essays)

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Essay 58. Pattern chemistry of rationality (pdf)
Essay 59, The Knot: Humans, Ideas, Things and Evolution of Ecosphere (pdf)
Essay 60, Art and Nexistence (pdf)

Essa

MAIN SOURCES FOR PATTERN THEORY

Ulf Grenander, *General Pattern Theory: A Mathematical Study of Regular Structures*, Oxford University Press, 1994.
Ulf Grenander, *Elements of Pattern Theory*, The Johns Hopkins University Press, 1996.
Ulf Grenander, *A Calculus of Ideas: A Mathematical Study of Human Thought*, World Scientific Pub Co Inc , 2012.
Numerous sites on the Web.

PATTERN CHEMISTRY:
Yuri Tarnopolsky, COMPLEXITY, http://spirospero.net/complexity.html

Demain n'existe pas

Tomorrow does not exist

Lara Fabian

1. ART AS ART

Essay 60 follows Essay 59, *The Knot: Humans*, *Ideas*, *Things and Evolution of Ecosphere* and completes my Essays. It is neither a source for art education nor art criticism. Intended as an illustration of pattern ideas, it is a selection of my subjective, biased, and fragmentary observations of a tiny part of modern visual art, taken from different, distant, and sometimes odd points. It should not be perceived as anything but an expression of my curiosity, personal taste, and opinion.

I tried to approach art in Essays 20, *On Artificial Art* and 39. *Painting the Ice Cream Soup*. In the latter, I wrote: "Irrationality is a precious gift of the artist and this is why art is a big mystery for the rational mind." I could not get half the mystery off my half-rational mind, however, and this is my concluding attempt to reconcile both halves.

I mean here by art, unless specified otherwise, the modern and, especially, postmodern visual art. My intent comes from my belief in prophetic abilities of arts. I am trying to understand what art is trying to tell me about the future in the language of shrieks, whimpers, and bizarre gestures for which we do not yet have appropriate words because words emerge from the past.

In my own private systematics, I divide all Western art history into four overlapping periods:

1. Ancient Art, including cave art.

2. Classical figurative art from the Middle Ages to its retirement after Haussmann's renovation of Paris, progress of communication and transportation, and decline of European aristocracy. Its maturity was shaped by Italian Renaissance. Experiments and mutations were always rocking the Classical Boat but not as wildly as to capsize it.

3. Art of the 20th century. It jumped out of the French Boat hit too hard by European wars and revolutions, industrial and otherwise. Wassily Kandinsky was its feisty ideologue, major contributor, and the First Prophet. His writings, among them *Point and Line to Plane* and *Concerning the Spiritual in Art*, attacked "conventional beauty" with the zeal of an ascetic preacher cursing carnal sins.

4. Art market of the post-WW2 revival and the Age of Affluence in the West. Andy Warhol, the Second Prophet, left his unambiguous Analects (*The Philosophy of Andy Warhol*) that erased from the definition of art everything but money.

The two last periods, especially, the Third Millenium, comprise what I mean in this Essay by art. Of course, its roots grew in the two previous ones. The cave art of France could be taken for postmodern art if discovered in a basement of a deceased reclusive artist.

Modern art, like modern culture in general, is fundamentally experimental. The words *fundamental* and *experimental* make an uneasy couple, however. Experiment in science is supposed to make foundations stronger and expand them. Perpetual experiment in art reduces the foundation to the simplest rules of the game, unchanged since the Second Prophet. Yet it is the spirit of the game that makes culture such fun. As for science, it has its own fun and beauty, but there is a huge difference: art is the body of all art ever created, while science is its own perpetually sharpened cutting edge, like the smile of the Cheshire Cat over the receding body.

Art in this Essay is the art of the headlines, multimillion sales, scandalous exhibits, world fame, and delirious or baffled reviews. This is a small part of the whole Art. There is also the huge but invisible, unless you run into it like into an iceberg, the underwater art of small galleries, local artists, art fairs, festivals, flea markets, garage sales, affordable internet sales, and "commodity art" that can be ordered online by your specifications or instructed to do-it-yourself like a true abstract expressionist. The daylight of attention and memory still reaches the surface layer of Whole Art where the most significant interesting original artists, alive and departed, rest among empty dollar hooks and where I had from time to time the treasured feeling of life that was radiating warmth into of my face.

The underwater art represents the entire history of art, its daily content, purpose, and function on the wall or a floor of human edifice, as value, status symbol, and decoration. It supports the presence of art in the cultural atmosphere of the nation and not just in its elite chambers. It is not represented here for the reason of its big size and underwater location, from which it watches attentively, jealously, but skeptically the events above.

> **NOTE.** In this Essays, using almost exclusively Internet sources, I looked for images with appropriate license for my post-stamp size illustrations. In its absence, I am relying on the principle of fair use and loss of detail in small images. The images play the role of buttons leading to original sites. Some well-known art is truly generic on the Web. In any case, the name of an artist alone is sufficient to conjure, with Google, his or her entire artistic heritage, as well as life and foibles.

Figure 1.1 shows a few artworks with the same unambiguous figurative content: horse (see also *Horses in Art*). To me they symbolize the eternity and unity of art,[50] which, as a true time machine, never forgets its past stored as material artifacts and not just verbal ruminations. With Google, the storage is searchable, but you need to know what you are looking for. The Web is full of dark corners with art surprises.

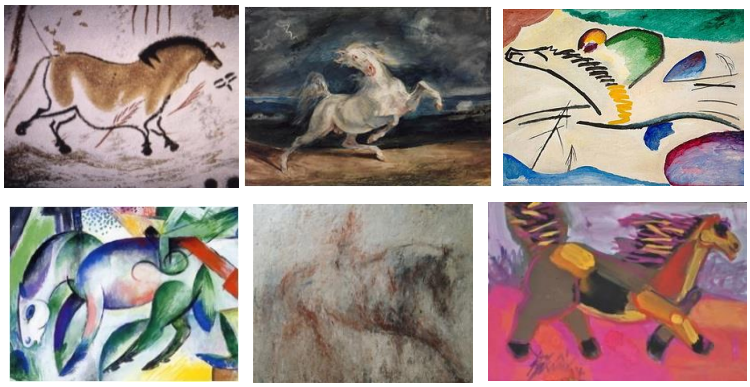


Figure 1.1. Horses.

Top: A horse from Lascaux cave, *ca*.15000 B.C.; Eugene Delacroix, *Horse Frightened by Lightning*, 1829; Wassily Kandinsky, Rider 1911. Bottom: Heinrich Campendonk, *Horse by the Lake* (detail), 1915; Judy Buxton, *Grey Horse* , *ca*. 2000; Do Phan (Đỗ Phấn), *Horse*, 2014.

While classical painting was well represented in Russian museums, the "bourgeois modernist" art was repressed in my Soviet time. It could be seen only through some cracks in the boarded up Russian windows on the world. Nevertheless, I was loosely familiar with its main directions and they failed to excite me. I had missed the striking evolution of art during the last 50 years and its turning into an economic phenomenon. In America, only the Internet gave me access to true modernity, which looked anything but "bourgeois." I have been immersed into Web art for the last three years. I am still making discoveries, like Richard Pousette-Dart (1916 – 1992) and Alfonso Ossorio (1916 – 1990), but it is difficult to surprise me.

Arts, especially music and poetry, have been as much my spiritual oxygen as chemistry and science. Classical music was the first arts wave that rolled over my head very early, in high school. It was more accessible than any other art in Russia. Poetry was the second, although the best of it was for a long time forbidden and later hard to find. I never missed a chance to visit art museums in Moscow and St. Petersburg (then Leningrad), but the absolute majority of my impressions were from reproductions.

The Web, planted with tollbooths on the highways to movies, music, and literature, leaves images free to look at, as a kind of billboards along the roads. Of course, it is not the same as art face to face, but one can get some idea. Anyway, I do not pretend being a connoisseur of art.

With all its exclusivity, visual arts—painting, sculpture, installation, and performance—are more accessible on the Web than other arts, although as an undersized, flattened, and often miscolored surrogate, with no assurance of reality like the smell and sound of a museum, gallery, or even a city square. The digital images, nevertheless, carry much more content than the shadows in the Plato's cave. Besides, although many modern originals lose very little on the screen, which reveals something unflattering



Deep Space (photo by Robert Franke)

[50] on why the animals in cave pictures are realistic while human are schematic. I[illegible]nybody see it as prophetic hybrid of life and machine? I can.

about them, the size is always the irreplaceable loss on the Web.

The Venice Biennale of 2013 and Sara Sze's exhibition *Triple Point* there suddenly opened to me a deep space of which I had been largely ignorant and dismissive. Irritated and prejudiced, I entered the halls of fame and infamy of modern art and I am now leaving them, impressed, almost reconciled, and definitely grateful. My reason took a good refreshing rest in this odd niche of our civilization. To lose it would make our life much poorer, like the sky robbed of the Milky Way by city lights. I never saw the Milky Way in America or anywhere else except in the sky over a completely dark Ukrainian village of my college years.

Art opened to me a view of the whole spectrum of pattern concepts and themes addressed in these Essays. Now, saturated with impressions, I am anxious to look behind visible horizons at what can never be seen, touched, and posted on the Web and yet is in highest demand, especially, as long as it either looks and smells good or just gives you goose bumps and makes you panic. It is the future, the epitome of ultimate and unquestionable **nexistence.** Tomorrow does not exist. And yet it does.

I want to use art as a *pattern window*, unobstructed by technology, into the future of the *Knot* of **Essay 59**, i.e., the future of all of us: humans, ideas, Things,[51] our pets, toys, and fetishes, our masters, slaves, friends, enemies, buttons, icons, shortcuts, accounts, and whatever else might spring up in the man-made ecosphere of the Third Millennium, A.D.

One of my first discoveries was Barnett Newman.

A large painting of a vertical white line on a blue background, *Onement VI* by Barnett Newman looks like a window with curtains drawn together. Having in mind that the painting was sold in 2013 for $43.8 million at Sotheby's, New York, what could we see with the curtains parted? Is there anything behind? What if there is something non-existing, which is neither something nor nothing: **nexistence**, as I will further call it? I use this contraction of **non-existence** for anything that cannot be perceived by human senses, may not make any logical sense, yet is a source of either debate or agreement, or influence on earthly matters, with a great real power, or even being a cause of war.



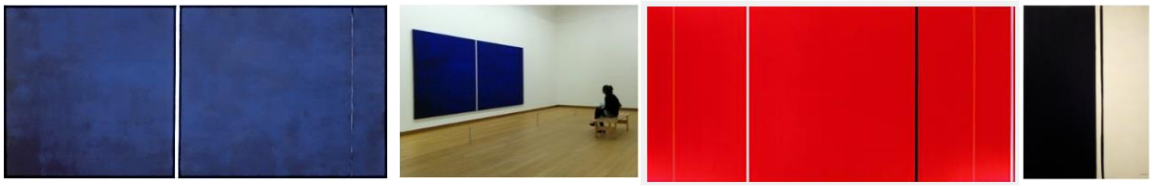
Barnett Newman (1905-1970)**,** ***Onement VI*** (1953; 102 x 120") **and its counter-abstraction (concretization?**).

I see the world as patterns[52]: similarity airways between distant continents and worlds. One of them connects *Onement VI* with a photo of a curtained window. In this case, a **similarity** can be recognized by most observers. I am interested in what

[51] I capitalize man-made Things as an evolutionary domain, on par with humans and ideas; see **Essay 59**. To capitalize also humans and ideas would probably make more sense, but they do not evolve as fast as Things.
[52] Patterns are typically regarded as stable regularities. Pattern Theory of Ulf Grenander and my chemical background guides me to the intimate mechanisms of pattern instability and change typical for human history and individual human situations. See Introduction to Pattern Chemistry.

is not visible to eye, however, and, especially, cannot be sensed in principle, even with most sophisticated technology.

I am intrigued and excited by what does not exist at all yet exerts force like some physical field, shaping the present and the silhouette of the future. I want to understand it. What can we see through the slit in the Newman's curtain? I will come back to it in the end. Meanwhile, I am using an opportunity to present more of Barnett Newman, **Figure 1.2**. See also his *Stations of the Cross*. Much more can be found on the Web, for example, Christie's lot notes accompanying *Black Fire*.



A **B** **C** **D**

Figure 1.2. Barnett Newman (1905-1970): A, B: *Cathedra* (1951), sold for $12 million in 1997, **C: *Vir Heroicus Sublimis* (1950-1951); D: *Black Fire* (1963),** $84.2 million in 2013. **B**: Photo by Autopilot, from Wikipedia.

Modern visual art is, probably, the only man-made object on earth that can be taken entirely by its face value. What is art? Is *Onement VI* art or wall painting?

"What is art?" This has been a simple question if limited to classical art. With modern art, which accompanied, somewhat trailing behind but looking far ahead, the emergence of modern industrial civilization, it is not so simple. The already *post-post*-industrial civilization is on its way but it has not yet arrived. It is like a mathematical expression with the opening bracket (but no closing one. If we trust sci-fi prophets (I do), it will be appropriate to call it post-human. And if we trust modern art as prophesy, we are coming to the same conclusion, watching the shrinking presence of life, human body, passions of the soul, and surrounding nature in modern art.

A regular commercial urinal, a pile of rocks or pieces of bread, dead animal, industrially made and bent gigantic sheet of steel, a canvas chaotically splashed or evenly covered by a paint of single color (monochrome), an unmade and untidy bed—is all that art?

Art is more than what you **believe** it is. My position regarding art as a whole is: everything that is called, presented, exhibited, advertised, handled, sold and bought, as well as forged, stolen, and destroyed as art is art. I will repeat this mantra, with a few variations, more than once in this Essay.

There is no art but art and to make art is an art in itself. But why is this art so different from the so-called classical art of all centuries before the twentieth one? What does this pattern of transition mean for the entire domain of human exystem? Does the all-you-can-eat art buffet symbolize some radical unique turn of history? Can anything like that happen in social life (the

loss of Federal Powers over the disUnited States of America) or science (synthetic life that, as Craig Venter promised, can create life forms without a preceding evolutionary history[53])? Reviews of modern art exhibitions or particular works, whether landmarks or new and obscure ones, are often written tong-in-cheek. One can clearly see the critic's bewilderment and vacillation between masked mockery and forced dutiful praise. Yet the apparent duplicity is not necessarily cynical. I can understand that perception of art even by a seasoned professional strongly depends on the viewer's mood, state of mind, personal memories, and even the weather outside. For a common viewer, the artwork seen for the first time is the best approximation of an accidental exchange of looks that could start a personal relationship after mutual ground testing.

There is no generic definition of art the way we define bread or bicycle because there are no limits to the variety of the tangible stuff of modern art. The world of art is huge but insular. It is the strangest domain of economy, an industry in which to produce more may mean actually to produce less: a unique object in a single copy for a narrowest segment of consumers, often, made with minimal labor, hired labor, or no labor at all. It is the kind of work where to be innovative is to repeat the same pattern, with some predictable variations (like the size of the iPhone?). Art is where speaking about art means composing phrases that have dozen possible meanings or no meaning at all. Is it the multi-speak, the descendant of doublespeak? Squeak-speak? Shriek-speak?

Like an astrophysicist, observing the stars and planets in deep space, hopes to trace the origin and the future of our solar system and planet Earth in it, I believe that art can tell us something about where we are and where we are all going as civilization. I believe in the prophetic power of art because art tells us, in a kind of sign language, our future before we can even invent words to describe something new and never seen and heard. As for "traditional beauty," it is abound in the lower tiers of the art world and some of it, not much, seeps up to the top.

"Art is what you believe it is" or "what is sells as art" or "art is nexistence" cannot satisfy anybody whose professional habit is to ask meaningful questions and answer them in a non-circular way. Art has monetary value and seems to be made of matter, which sounds like it is brimming with existence. Next, I am going to look at art from those two angles.

[53] "Synthetic biology frees the design of life from the shackles of evolution"

2. ART AS MATTER

So, here we go again. Repeat after me: art is what is made, called, exhibited, and sold as art even if somebody says it is not art.

Is that so? If that is true, art is as much a matter of belief as a matter of matter. "A matter of…" is a figure of speech, but belief is not about matter. Doubt is the signaling smell of belief, its pheromone. If the believer stands firmly by his faith, then he will doubt your beliefs and, occasionally, his own. Yet the palpable and measurable physicality of art is unmistakably and unconditionally there. It is a thing like any other and it does not need any belief to assert its existence. Why is it so difficult to define art in a non-circular way? Moreover, it is difficult to speak about art as we speak about bread, stone, money, and the fabric of everyday life, even though all that can be the stuff of art.

Modern art reveals to public in the ornate and gilded Klimtesque attire of *artspeak*. Here is a small taster of its vocabulary:



Gustav Klimt, *The Kiss* (1909). From Wikipedia

Abstraction, aesthetics, aggression, allusion, ambivalence, awareness, beauty, challenge, concept, context, controversy, creativity, declaration, depth, efflorescent, elemental, elusive, elucidatory, emotion, energy, exaltation, existential, expressive, ferocious, gestural, glyphic, harmony, humanism, imagination, individualism, innovation, inspiration, intensity, interpretation, invocation, irony, libidinal, meaning, motivation, muscular, mystery, mythological, melancholy, noble, palimpsest, poetic, pivotal, projection, purity, reference, rejection, scatological, signature, somatic, space, speculation, spontaneity, subjectivism, sublime, sumptuous, symbol, syncretic, syntax, talent, taut, texture, visceral…etc.; "dwelling on the threshold," "silent space between and around words," "mobilization of the space between reading and seeing," "bondage to form," "bounteous exchange," "brutally human," and more.

The most primitive, crudest, and offensive piece of modern art can still be presented and analyzed in artspeak. *Mea culpa*, I fall into *myspeak*, which is no better.

Rarely can we find something that contrasts with artspeak as much as this quote from a fiction book about art:

> "…on the one hand fun, sex, kitsch, innocence; on the other trash, death, cynicism.[54]"

I realize that almost any review of art, music, and book is a balancing act for the professional critic. I rarely read art books and reviews, except in *The New Yorker*, where nobody wants to be hurt by falling off the high wire. Yet Sarah L. Thornton's book *Seven days in the art world* (2009) lets you sneak into modern art world through the back door. In her later book *33 artists in 3 acts* (2014), she sets the matter straight from the start: "Artists don't just make art. They create and preserve myths that give their work clout" (page XIII).

I have noticed two outstanding art reporters: Jonathan Jones, *The Guardian* (UK), and Sebastian Smee, *The Boston Globe*. I now suspect that artspeak has a range of dialects, some of them intelligent, serious, and delightfully ambiguous. Reviews of Peter Schjeldahl in *The New Yorker* can offer the artist a Greek gift with stratospherically higher artistry than their targets.[55]

Art, however, is not what anybody says about it. Art appears to a viewer as honest man-made and often defiantly raw matter. By physical materiality I do not mean the properties of the medium of artwork which today varies from excrement to gemstones, from brick to bread, and from cadaver to live flesh. I mean that, whatever we all say or hesitate to say about a piece of art, it is a **thing** that takes space, has mass, can move or be moved, reflects or emits light, smells, sounds, and can be licked to taste it. Moreover, this thing, like you and I, is not made in thousands of copies and, strictly speaking, cannot be considered Thing: a loop of the Knot (Essay 59), on par with humans and ideas. It is unique by definition, although it can have twins, clones (prints), close variations, and imitations. Modern art grows in big and supportive incest-ridden families, but not without divorces and remarriages.

No electronic microscope can find any harmony or melancholy in the cracks of paint. You can be invited to put an artificial paper-on-aluminum stone on your windowsill (Sarah Sze in Venice), walk on art and occasionally steal it (Ai Weiwei at Tate Modern), and annoy or hurt the artist (Marina Abramovic, Naples, 1974). You can put your finger on expression, harmony, and mystery, but only metaphorically. The X-rays and electron microscope may help with suspected forgery but are mum on the poetic, romantic, and libidinal.

Paintings, sculpture, and installations can be seen, touched, weighed, measured, appraised, mangled, and kept under lock. In market economy, art is tangible investment: something you can lay a hand on, literally, not metaphorically. Tyrannical regimes, religions, and ideologues can proclaim art subversive and ban or destroy it, even together with the artist. Yet art could replicate and spread because artists borrow from each other, paying back in the currency of fame.

[54] Michel Houellebecq, *The Map and the Territory*, Knopf, 2012, p. 129.

[55] "When I think of Richard Serra's work as art, or of art as what Richard Serra does, a bracing bleakness descends, like that of a stern northern region, where people live gladly, while under no illusion that it's the isle of Capri." Peter Schjeldahl, *Industrial Strength*, *The New Yorker*, 2007/06/11, p. 146

Originality is power, but so is similitude. Photography, initially the threat and then the blessing of visual art, combines both and turns one into the other.

Performance art is witnessed and recorded on films and digital media. Reproductions are more like reductions, but they make art available to those who, like me, are far from museums and galleries.

Art is as different as framed squiggles and splashes of paint, rusty sheets and rods of steel, heaps of refuse, pointless human labor, sleep before an audience, countless paintings of apples, lilies, parallel lines, and color blots. The heart-squeezing Rembrandts, monsters of Goya, self-mutilations of Francis Bacon, Raphael's *Madonnas* —all those things are art. As we have no choice but to accept all the gore, greed, glut, and glory of human history, we have to accept art as art whether we like it or not because it **is** history. It is the future that we can squabble about.

Obviously, I dislike a lot of art. Modern art, which I am trying to understand, forces me to look at myself and try to uncover the reason of my apprehension. My habit of a chemist to ask the childish question "what is it made of?" could be part of the problem. I need to look at the backside of everything and take things apart down to atoms.

Figure 2.1 illustrates the physicality of art.



Figure 2.1. Art as thing. Left to right: Michelangelo, *David*, front and back; Van Gogh, *Bedroom*, front and back; Richard Serra, *Fulcrum* (steel); Ai Weiwei, *Sunflower Seeds* (porcelain).

Yet as money has lost its exclusive materiality so has modern art. As an image or a video from a digital file, even the purebred material art becomes less material—or sometimes more so when it involves live matter, as performance art does. Modern art can be made of anything, including nothing, and the borders between something and something else dissolve in modern art as in a dream.

Modern painting uses a lot of historically new stuff, like anything that can stick or be glued to any vertical surface, from elephant dung (Chris Ofili) to gunpowder (Cai Guo-Qiang). "Anything" says it all. Thus, Mark Quinn (UK) has been making realistic sculptures of his own head from his frozen blood.

In addition to "anything," modern art has added a whole spatial dimension with the genre of installation, which is the same "anything" but in 3D space. The fourth dimension—time—is put to work in mobile sculpture and variations on the theme of flowing liquid. I think that metabolic life can be considered the fifth dimension of art, as it is in theater and circus.

Cai Guo-Qiang created an installation so awesome that I am out of both artspeak and myspeak (Google: **Cai Guo-Qiang Head On**). This could be a case for silence in talking about art.



Cai Guo-Qiang, *Head On*. Photo: Tony Hisgett , Flickr.

But I can't shut up. I ask myself: Are the wolves "we" or "they?" Are the wolves made of sheepskins or dog skins? Do they hint to "a wolf in sheep's clothing?" Does the glass wall allude to the Great Wall of China or the wall of censorship (you still can make it transparent)? I like art that prompts questions other than "is it art?" and stimulates my brain. It is the practicality of an engineer.

I mention *Head On* here because, being completely immobile, it manages to unroll in space and time. The probable trajectories of each of the 99 wolves can be traced from the next room to the glass wall.

There is also a one-dimensional art of geographical and, therefore, time-consuming magnitude. The *Running Fence* of Christo and Jeanne-Claude runs on the spot for almost 25 miles across hills, ravines, and roads from Northwest of Petaluma to Bodega Bay in California. The enormous size of this ephemeral and quickly extinct creation is counterbalanced by miniatures and the microscopic art accessible only under magnification (**Figure 2.2**).



Christo and Jeanne-Claude, *Running Fence* , 25 miles. Sonoma and Marin Counties, California, 1972-76 (Smithsonian).



Vincent Gandia **(1935- 2009), Miniature etching, 2" by 2" including the margins.**

Figure 2.2. Size in art.

It occurs to me that installation by its very "anything goes" nature never looks as authentically abstract as point, line, or a color field in panting—the flat Mother Earth spans under all kinds of art. Installation can be regarded as a transformation of flat painting. Abstract art, which, along Kandinsky, should be just "points" (fields) and lines on a plane, instinctively wants to have flesh on its thin bones.

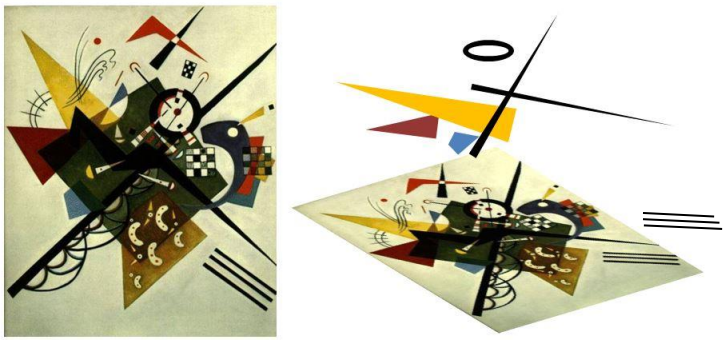


Figure 2.3. Wassily Kandinsky (1866-1944), *On White II* (1923) and its partly deconstructed 3D "pile" pattern.

How can everything develop from nothing and anything from something? This is the topic of the chapter ART AS TREE, but it seems appropriate to give a fully speculative illustration here.

Figure 2.3 shows one of the most famous paintings of the one of the

most famous founding fathers of abstract art: Wassily Kandinsky, *On White II*. To me it looks like a **pile** of flat abstract forms seen from above, i.e., a projection of a 3D object onto a plane. Why pile? First, the figures overlap in a sequence so that the lower ones can be seen through the semi-transparent higher ones. Second, the center of the picture has the highest density of the figures. It seems that we could take them one by one from top to bottom, as if it were a pile of cards and toothpicks. Could we turn it into installation with a 3D printer?

When I began to immerse myself in the tickling waves of modern art, I found it as much daring and innovating as dull, repetitive, and mutually imitative work.[56] The worlds *modern*, *avant-garde*, and *experiment* for anything as old as modern art, which already is well over 100 years old, are really misleading, even if it has been made today. It is now a mature, entrenched, and conservative movement that deserves, desires, and dreads a **new**, real, full-blooded and sweeping avant-garde. This is where the future lies, prepared to jump in on us like the wolves of Cai Guo-Qian. But will the glass or (the Great Chinese) wall of money stop and scatter them, tails between their legs?

How can you create anything new in the genre of anything? I call this conundrum "the trap of anything goes." Whatever you create is not new: it is just different version of the same.

Pile is a popular and already iconic genre of modern art. There are piles and heaps, and stacks and mounds, and piles of piles, some of them shown in **Figure 2.4.** I shun here the esteemed sub-genre of trash and poop piles.

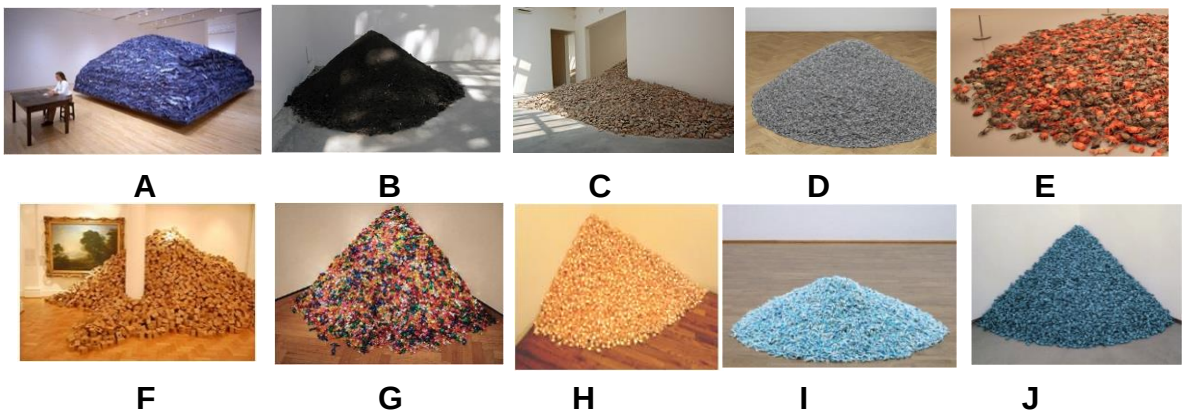


Figure 2.4. Piles. A: Old denim clothes (Ann Hamilton); B: dirt, C: gravel (Lara Almarcegui); D: porcellain sunflower seeds , E: ceramic crabs (Ai Weiwei); F: *Yellow bird boxes (Carwyn Evans); G to J:* Felix Gonzales-Torres, *Lover Boys*, wrapped candies displayed at four out of many different exhibitions.

Pile presents an interesting case from the point of view of complexity. If it is large by the number of components but homogenous by composition, is it complex? I classify it as simple. It

[56] I am sure the boredom and monotony goes up with higher rankings of the artist, but I cannot figure any objective measure for boredom. In principle, monotony can be measured as an average distance in configuration space.

can be described in a few words and made with little mental effort. If a big physical effort needed, the teamwork in art is not mortal sin.

I believe that complexity, mental effort, physical effort, and uniqueness (originality, inventiveness) are the main components of the artistic value. It is my personal belief, it tells something about me, not about art, and I will come to that in ART AS MIRROR. From this point of view, the lack of effort looks like the chronic anemia of modern art. The pile art form is an old hat but it is in vogue because it is both easy and respectable as new retro. I am mean, I know.

Modern outbursts of minimalism—from giant steel labyrinths to polished steel toys—try to compensate for the simplicity and monotony with oversizing and industrial technology. This explains why modern art has only a few biggest stars: the lightning in art typically comes from a loud bang, not *vice versa*, as in the nature. In the business of technology, the winner takes (almost) all.

Proclaiming the unfettered combinatorial self-expression, Kandinsky caused an incurable affliction of art. The abstract combinatorial pattern space, contrary to the promise of freedom, presents an extreme restriction. Once you (or maybe just people like myself) have seen a couple of configurations, you (at least I) have seen them all. The digits from 0 to 9 generate all possible numbers. If you saw ten digits, you saw all numbers. It is only for the mathematician working in a particular area of number theory that all numbers are different. The problem of modern art is pernicious aging,[57] for which the best remedy is not to talk about it. Besides, in art, age is an asset.

Even though the combinations can never be exhausted, the simple principle "anything goes," further fortified by Warhol, is becoming a totalitarian dictate.

This is something Marcel Proust anticipated, in my opinion, when he wrote:

> We invariably forget that these [beauty and happiness] are individual qualities, and, mentally substituting for them a conventional type at which we arrive by striking a sort of mean among the different faces that have taken our fancy, among the pleasures we have known, we are left with mere abstract images which are lifeless and insipid because they lack precisely that element of novelty, different from anything we have known, that element which is peculiar to beauty and to happiness.
>
> (Marcel Proust, *Within a Budding Grove*, translation by Moncrieff, Kilmartin, & Enright; Modern Library, 1998, p 318)

Constraints in visual arts are never as tight as on the balance beam in gymnastics, rhymed poetry, or musical performance. Yet from the cave beginnings of art, there was a powerful constraint of

[57] As Peter Schjeldahl writes in *The New Yorker* (11/09/2015) about Frank Stella (born in 1936): "Even groundbreaking ideas have life spans". I gratefully add to my artspeak collection *cynosure*, *apothegm*, *deathly glamour*, and *more strenuous than ecstatic* from his article. But, unlike typical artspeakers, Schjeldahl can be really critical and get to the bone, if not to the very heart.



likeness of the picture to its object, even if the object was a fantasy. Even a weak subconscious click of recognition connects the picture with the **viewer** who would otherwise pass it over.

Naturalistic likeness retains its downsized and renovated home in art. Most non-representative artists have their own constraints, too, which I would call self-similarity constraints ((Piet Mondrian and Mark Rothko are stellar examples of self-similarity boredom, I am adding sacrilegiously in double parentheses)).

Marcel Proust casually noted the role of constraint in arts:

> My mother was obliged to stop, but she derived from this very constraint one more delicate thought**, like good poets forced by the tyranny of rhyme to find their most beautiful lines:** "We can talk about her again when we're by ourselves," she said softly to Swann.
>
> *Swann's Way*, Translation (heavenly done) by Lydia Davis, 2003, p. 24.

"If you never tasted slavery, you never know freedom." Self-imposed constraint is masochism, but no slavery. It is mastery.

The solid constituents of pile art—soil, gravel, stones, candies, bird boxes, tiny figurines—cannot be arranged exactly the same way twice. Piles allude, unintentionally, to Heraclites' "you cannot step in the same river twice". Pile art is as much fluid as it is solid (typical artspeak, but true). Thus, bulk rice and coins are solid but conform to gravity and the shape of the container.

A pile can be just a part of a complicated scene. The pile ***A*** in **Figure 2.4** serves as a centerpiece of the installation *Indigo Blue* (1991, 2007) of Ann Hamilton, which I, a sceptic, like it more than I like to say. It is irresistible.

> In the center of the space, a 17' x 24' steel platform was piled with 14,000 pounds of blue work clothing. Built layer by layer, the pile was formed by smoothing successive strata of pants and shirts until a volume of clothing the size of a semi-truck was formed. At the back of the space, obscured from view by the pile, an attendant sat and erased slim blue books at a table borrowed from the central market, which formerly housed one of Charleston's pre civil war slave markets. Using a Pink Pearl eraser and saliva, the books were erased back to front. The eraser waste was left to accumulate over the duration of the piece. Although the space was entered at ground level, a window accessible in the small upstairs office of the garage gave another view of the pile of work clothes and the activity at the table. One wall of the office was hung with udder-sized net bags of soybeans that sprouted and later rotted in the leakage of summer rains. With the humid weather, the space was filled with the musty smell of the damp clothes and the organic decomposition of the soybeans.

I can say why I love it: the installation is a dense complex web of associations in which Things, humans, and ideas (Knot of **Essay 59**) are bound tighter that men and serpents in *Laocoon*. It is a complex act of thought constrained by logic and links with reality.

Tobaron Waxman's installation *Lechem Oni / Prusa*, which means "the bread of poverty, sliced" in Hebrew, is a pile of 400 glycerin soap bars. A comment says:

"Lechem oni - prusa invokes iconic Holocaust imagery with the intent of criticizing the misappropriation of the Holocaust as a means to bias mainstream opinion. The artist makes the soap bars in the gallery, encased in each bar is a piece of hand-made matzah baked by the artist in the traditional manner in a matzah factory. The soap bars are then assembled in piles, recalling the piles of Jewish belongings and Jewish bodies discovered at concentration camps, with the soap itself an allusion to the Nazi practice of making soap from the fat of Jewish bodies."



Tobaron Waxman, *Lehem Oni. Prusa (2006).*

I, a contemporary of Holocaust, better abstain from comment. OK, I have one. Abstract art, to escape boredom, is desperately seeking some kind of anchor in real life. It can be a reference to natural scene, trendy idea, political protest, historical association, national icon, celebrity, pop merchandise, etc. It tells me about the genes of advertisement in the DNA of modern art. Abstract art needs nutrients as much as the artist does, but, asking for bread, **you** expect to get a rock. Or a candy, if you are at the right place.

Ai Weiwei's zillions of handmade sunflower seeds are, unlike his aggregations of 6000 stools and 1000 bicycles. They have been presented in piles, as well as in the form of a field or, rather, shallow pond.

What did Ai Weiwei want to say with his sunflower seeds? I saw various interpretations, most under constraint of political correctness, others critical. Here is what his work tells me.



Ai Weiwei: Sunflower seeds. Left: Chinese craftsmen paint the seeds; right: Visitors trample the seeds at Tate Museum.

When I look at the photo of the field/pond of seeds opened to visitors to walk and sit on at the Tate Gallery exhibition (2010), I think about the Chinese porcelain craftsmen who for two years were paid to paint millions of seeds with a tiny brush. I perceive Ai Weiwei's project as a mockery of human reason and work.[58] It is my strictly personal interpretation. I do not intend to put down the artist or anybody else. This interpretation may not say anything about the work, but, again, it says something about me. I belong to the generation of people who believed in the sacred value of human work and lived in a country where this sacred work was either symbolically paid civil duty or forced labor. This is nothing but my belief. The problem with belief is that there is **no way to find out** whether myself, the artist, and the critic really believe what we all are saying, all the more, what it means. This is what **nexistence** means, why it is not nothing, and how it moves human hands, can sustain life, and can kill.

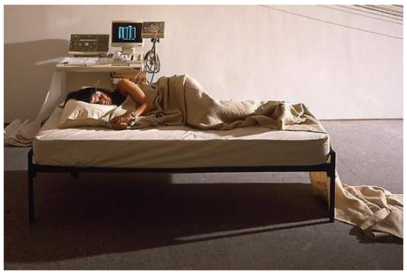
The reason why I cringe at some modern art and wince at another does not have any objective connection with the art. It is my reaction to it. Art can be an undecipherable self-expression of

[58] See Evan Osnos, *Age of Ambition: Chasing Fortune, Truth, and Faith in the New China*, (Farrar, Straus, and Giroux, NY, 2014) on Ai Weiwei.

the artist, to which we have no clue, artspeak or not, but it is also a self-impression of a viewer, to which nobody else has a clue, either. Modern art and modern public are playing volleyball over a brick wall, never really seeing each other. Just myspeak**.** More about this later, in ART AS MIRROR.

The piles of Lara Almarcegui do not look revolutionary in a lineup of piles, **Figure 2.4**, but neither are they as primitive. She exhibited similar piles at Vienna Secession in 2010 and in Rotterdam in 2011 and there is a story behind her work that is truly relevant and can be trusted, which is unusual in art. The piled up materials are the actual components of exhibition halls. The weights of the piles reflect the real proportions of the components. She deconstructed it somewhat similar to the way I tried to deconstruct Kandinsky's pile in **Figure 2.3.** See more about it in ART AS STONE.

From stone to its absolute opposite: life. **Figure 2.5** illustrates art made of human body, but not the body painting.



Janine Antoni, *Slumber* (1994). She sleeps in the gallery for 28 days while an EEG machine records her REM patterns. She then weaves them into a blanket from her night gown under which she sleeps. Source.



Tilda Swinton, *The Maybe*, 1995/2013, MoMA. Listed as: "Living artist, glass, steel, pillow, linen, water, and spectacles." Photo by M Liao. More photos.



Petr Pavlensky, *Carcass*, May 3, 2013. "Assistants brought him naked and wrapped in a multilayered cocoon of barbed wire to the entrance of the Legislative Assembly of St. Petersburg. "

Figure 2.5. Art as living matter.

Although already desensitized to modern art, I lost my equanimity for a moment at the sight of the otherworldly actress Tilda Swinton (I am her visceral fan) sleeping in a glass box as a component of her installation *The Maybe* (1995 and 2013) at New York Museum of Modern Art (MoMA). The explanatory note listed her among other material evidence: "Living artist, glass, steel, mattress, pillow, linen, water, and spectacles." The living artist, however, was absent most of the time and was supposed to appear without warning. Therefore, her **absence** was as much part of the installation as presence. As the museum staff explained, the **uncertainty** was part of the **concept** of the appropriately entitled artwork. I had a sweet tingling feeling of deep ambiguity. I instinctively felt charmed by the inventive power of art. The platitude of both idea and its realization was *post factum* evident but woman's body always adds a level of complexity to anything around it.

The Maybe was created by Tilda Swinton and Cornelia Parker. The latter also worked with stone (ART AS STONE). Cornelia Parker has, probably, the widest range of imagination and sense of material among all installation artists I know. She works with body, stone, metal, fabric, meaning of words, and pure nexistence in the form of physical absence! I, entranced, surrender to her art without vacillation, like Odysseus to Circe, with the magic herb of doubt just in case.

I was also greatly impressed by the fearless and adventurous Janine Antony. Her *Slumber* (1993, 1994) was inventive, complex, and poetic, combining scientific and vaguely fairytale motives. In *Slumber* (1994), Antoni[59] lives in the gallery for 28 days. While she sleeps, an EEG machine records her REM patterns, which she then weaves into a blanket from her night gown under which she sleeps. More about her.

Petr Pavlensky represents conceptual street art in its extreme form and in a most oppressive kind of environment. The origin and style of his techniques could be recognized by those familiar with self-mutilation of convicts (not by political prisoners, whose craft is hunger strike) as protest in Russian prisons. Here is a description of the act:

> On May 3, 2013 Pavlensky held a political protest action against repressive policies of the government. His art performance was called *Carcass [Tyuа]* . Artist's assistants brought him naked and wrapped in a multilayered cocoon of barbed wire to the main entrance of the Legislative Assembly of Saint Petersburg. The artist remained silent, laying still in a half-bent position inside the cocoon and did not react to the actions of others, until he was released by the police with the help of the garden clippers.



When on November 9, 2015, I saw the headline "Controversial Russian artist arrested after setting fire to the door of secret services building," I knew it could be only Petr Pavlensky.

The ephemeral and sometimes masochistic genre of performance art has a substantial and fascinating history with roots in theater and family entertainment (*tableux vivants*). The radical and disturbing Marina Abramović is the leader in balancing on the edge.[60] There is a documentary about her: *The Artist is Present*. She says that performance art, unlike theater, is for real.

Modern art is literally anything you can call art and exhibit as such, and yet a few artists are always more daring and inventive then others without being vulgar, offensive, or scheming. But would I feel sympathetic to "lady in the glass box" as a concept if I disliked the actress instead of being her admirer? I emotionally accepted *The Maybe*, but rationally, I saw the specter of futility

[59] A Ph.D. thesis on Janine Antoni: Stephanie Ann Karamitsos, *The Art of Janine Antoni: Labor, Gender and the Object of Performance*, 2006.

[60] Some of Abramović' experiments involve interaction with public with results, to no surprise after the "Zimbardo experiment" (also known as "Stanford prison experiment," 1971), that human crowd is naturally distributed between sadists and saints. This contradicts the assumption that the prison environment is the main reason for cruelty. Bullying is another natural experiment. See documentary *The Artist is present*, 2012.

and dehumanization hovering over the absolute majority of modern art where humans play the parts of Things. That was when I suspected that I never see art *per se*. It is always the image in the center of the whole web of my individual intellectual an emotional associations, memories, preoccupations, and even current physical sensations. In other words, art is a mirror, and the mirror right now shows me myself, holding the poster "Add *homo sapience* to Red List"



Art is as tangible as rocks and bodies. You do not need to understand it, just touch the stretched out of nowhere hand of art. You will feel, however, that it is not the same as touching the warm living body. In spite of all experiments with nothing, modern visual art—painting, sculpture, installation, etc.—is overwhelmingly **thingish**, geometric, calculated, man-made (sometimes, industrially), and corporeal without any trace of the **soul,** except, probably, in environmental art, with its life dimension. The double nexistence of the spirit and matter in the minimalist outgrowth of modern abstract art is truly awe-inspiring. On the contrary, the full-bodied necrophilic art (Damien Hirst's animals in formaldehyde and Gunther von Hagens' plastinated human corpses) is as material, real, natural, solid as any exhibit in a museum of natural history or the notorious *Fountain* of Marcel Duchamp, which is not even the original urinal but its substitute. Even an elephant in brine, however, could not compete in my eyes with the absence of Tilda Swinton on her bed, still losing the warmth of her body. Am I really saying that?

As for Andrey Kuzkin's, *Whatever is out there* , 2010, (movie) I do not know what to say or think. No, he is no rival to a fully dressed Tilda Swinton. But it is art, too. Say the mantra.

3. ART AS MONEY

Every great artist, writer, composer, inventor, and scientist was driven by instinctive fear to repeat something already done and known. Innovation is the magnet that separates the iron filings of greatness from the wood sawdust of mediocrity.

Why could the skimpy, defiant, arrogant, and violent novelty of the first abstract painters become routine mainstream with historically breakneck speed, while similar extreme innovations in music and literature are still confined to minuscule audience (to which I, now proudly wearing the badge "I have read *In Search of Lost time*," belong)? Not expecting to find an indisputable answer, what else can I do but to keep searching for it at a place where Everything rubs shoulders with Everybody: the marketplace?

There is art and there is art market.

Visual **art for art's sake** (*ars gratia artis*[61]), cloistered in palaces, temples, museums, and mansions, protected from elements and thieves, looks like the most exclusive, hermetic, and immutable human creation, removed from social turbulence, politics, and in fact, from anything else people care about, need, make, and consume. Art has little utility, but it has value. As for utility, in hard times—war, occupation, illness, cold winter—selling a painting could save life and burning could at least make a cup of hot tea[62]. Nevertheless, it is in good times that art sells for the highest price.

[61] The Latin motto appeared not in Antiquity but during the Industrial Revolution.

[62] In good times, in a novel *You Should Have Known*, by Jean Hanff Korelitz (Grand Central Publishing, 2014), a woman explains her attraction to a man: "He has a Rothko!"

Money circulates through the large arteries and tiny capillaries of global civilization. Art market is one of the body's minor organs, like the spleen, and, however insular, it needs blood. Being just a man-made Thing[63], art displays a mysterious special relation with money, something like the relation between the body and the soul, only I cannot decide which is which. In a way, art **is** money, if we skip squabbling over what "is" is.

The price of entry into museums is affordable or even free on some days. Visual arts are better accessible on the Web than published scientific papers. Sculptures, occasionally scandalous or baffling, challenge the weather and vandals in parks and squares. Yet art today is anything but *gratia artis.* It changes hands for weighty, even if digital, wads of money.

I believe in the penetrating power of image. It is not slowed down by logic and syntax. It invades mind as unstoppable front of parallel armed columns. It works its way forward, ringing the bells of associations in unpredictable manner. This is why I illustrate my Essays with small pictures instead of extra paragraphs. It is a habit of a chemist who thinks and converses about molecules not in mile-long chemical terms but in pictures. Here are two images to the point in **Figure 3.1**.



Figure 3.1. Soup can and yacht, one of each.

Andy Warhol's painting (actually, photo-transferred screen print) Big Campbell's Soup Can with Can Opener (Vegetable), 1962, 72 x 52", was sold for **$23,882,500** at Christie on November 10, 2010 and the **Eurocraft 44 Explorer** yacht, 144' 04" could be ordered for **$18,417,000** in 2015, to be built next year. I wonder how much Andy Warhol's painting of that yacht could cost.

Although *Big Campbell's Soup Can with Can Opener* "is a highly important and rare early painting by Andy Warhol showing the great icon which quite literally changed the course of Post-War Art: the Campbell's soup can" (quoted from Catalog), the price is baffling because neither the content nor the form are in any way unique, all the more, artistic. Many people do it every day in advertisement industry and some keep the original in the pantry. What is unique and artistic, we are told—and Warhol insisted[64] (and I agree)—is the very fact that it is **presented and sold as** art. It is a masterpiece of self-advertisement. Any masterpiece has a golden aura and, even if it is art robbery, can inspire a masterpiece of a movie.



[63] Here is a difference between thing and Thing. In performance art, exemplified by Marina Abramovic, the human plays the role of a thing, but the whole performance is a Thing because it is designed for income. Capitalized Thing is a super-species in the realm of economy, of which humans and ideas are two other super-species.

[64] I highly recommend Warhol's *Philosophy of Andy Warhol (From A to B and Back Again)*, 1975, available online . It is a revolutionary *post factum* manifesto of modern art.



Napoleon is famous (among other merits, as art plunderer) and I am not a bit surprised that his hat, one of several remaining ones, was sold in 2014 for $2.4 million. The hat caps the enormous historical shadow of Napoleon. But a picture of a soup can?

Andy Warhol's revolution in art was his declaration, influenced by Marcel Duchamp and others, that artist should obey only his own impulses, not necessarily artistic. The artist does not owe anything to anybody. On the contrary—and that was his own contribution to the doctrine—the buyer owes money to the artist for the result of his work regardless of content. The belief in the value of the work is its true content, which is to say that the artist himself, his life, escapades, sufferings, quirks, and, last but not least, financial status can be the exact content of his artwork, whatever is there on the canvas. We will come to that in ART AS BELIEF. Naturally, this content jumps to the largest value after such a grand event in artist's life as death.

I apologize. Sorry, sorry! I am ashamed of my retrograde juxtaposition of art and yacht. I was repeating the argument of the Duchess de Guermantes in Marcel Proust's *In Search of Lost Time* (*The Guermantes Way)*:

> There was nothing else in the picture, just a bundle of asparagus exactly like the ones you're eating now. But I must say I refused to swallow M. Elstir's [a fictional artist whose prototype was Édouard Manet] asparagus. He wanted three hundred francs for them. Three hundred francs for a bundle of asparagus! A louis [20 francs], that's as much as they're worth, even early in the season.[65]



Édouard Manet (1832-1883). Bunch of Asparagus, 1880.

The soup can is a kind of a triple point where (1) art, (2) art market, and (3) food market meet, quite like in Manet's *Asparagus*. Still, I ask myself the following question: what was exchanged in the sale of Warhol's work?

Both Manet and Warhol, separated by 100 years, had been ridiculed and both ultimately triumphed, although against different historical backgrounds. Both found supporters during their lives. Both were vilified for their techniques as well as for the choice of subject. Yet my personal impression is that if the legacy of Manet can be discussed in such a way that the opinions of experts gravitate to a certain consensus, any interpretation of the legacy of Warhol seems to be as true (or false) as ten others. For example, the can **opener** has been interpreted as a symbol of violence. Why not as a bold venture that had **opened** a whole new continent of content? Why not the sharpness of art that uncovers the meaning of everyday rot?

I think we have to give Andy Warhol another half-century to mature. It is yet a half-opened can. But it is already huge money.

[65] (Marcel Proust, *The Guermantes Way,*translation by Moncrieff, Kilmartin, & Enright**,** *Modern Library, 1998, p.686)*. There is a real story behind this episode. In fact, the painting was sold for 800 francs, but that was not the end of the story.

With eyes already attuned to art, let us now look at money, a frequent and dear subject of Warhol.

As compared with 3D sculpture and installations, the lower grade materiality of 2D painting gives the art form additional similarity with money. The material art is less material in painting. The materiality has potentially some further way to go down.

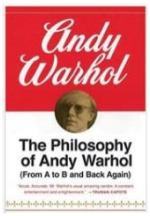
> There were reports that the ultra-rich keep "billions of dollars' worth of fine art and other treasures" in freeports where their materiality—and taxable value—may hardly ever be explored by human touch. "Under the freeport's rules, objects could remain in untaxed limbo, in theory, forever." Sam Knight, *The Bouvier Affair*, *The New Yorker*, Feb. 8&15, 2016.

There is a noteworthy investigation of the profitability of art for artists: Jonathan Jones, *Do rich artists make bad art?* (The Guardian, 27 April 2006) . The title question exemplifies the fundamental problem of art: **what is bad/good art?** This question has no answer. All we can agree on is the *fait accompli* of the sales history.

A single framed painting is neither good nor bad. It is a leaf on the evolutionary tree. It is a point in history. It is a point on a numerical scale. Art as a system (exystem: evolving complex system) is not as numb as it may look in a gallery: it breathes, moves, morphs, and tries to catch your eye with flirtatious makeup. With such signs of robust muscular life, art is truly abstract in the sense that its only measure is the latest sales number.

Picasso and Warhol were two, among many, pinnacles of modern art who had been considered "bad" art in the beginning of their careers. Pablo Picasso (1881 – 1973) produced over 10,000 paintings, many of them priced later in millions of dollars. Using a great variety of techniques, he also made ten times more prints, some in 500 copies and some in much less. There are hardly any high rank prints on the market below $1000 and rarer prints cost ten times more. Picasso printed his own money, one could whisper, multiplied by posterity many times over. He hardly used it himself, however.

Picasso the misogynist does not excite me as artist.[66] But I am certainly a misfit: I am bored even by most of Mozart, as I am confessing ahead of ART AS MIRROR. Andy Warhol, as all pop and minimalism, repels me—something I should probably keep in the dark as a shameful secret, as if shameful secrets have no value in our days.



When Andy Warhol (1928 – 1987) died, he left over 90,000 works, including 4,100 paintings, 9,000 drawings, 19,000 prints, and 63,000 photographs. This makes his creations, often deliberately cloned—like his posts stamp sheets of multiple Marilyn Monroes or Campbell soups and pictures of money—closer to paper currency or mass products than anything else. Money was his obsession of which he left a record in his *Philosophy of Andy Warhol*, where money is on the foreground. Here is a quote:

[66] Jonathan Jones cites Picasso's warm relationship with Lee Miller as evidence that he was not a misogynist. But his portraits of the American photographer, not to mention all his other pictures of women, mean in my universe that he was. Jonathan Jones admits the "cartoonish cubist freedom" of those portraits in which Picasso's "art suffers."

> I like money on the wall. Say you were going to buy a $200,000 painting. I think you should take that money, tie it up, and hang it on the wall. Then when someone visited you, the first thing they would see is the money on the wall.

In our times of great income inequality (as if there ever were times of equality), it is curious to read Warhol who saw a can of Coke as a unifying and equalizing symbol: millionaire or not, everybody drinks the same Coke (I do not. Long ago, I used to drink Pepsi.).



Andy Warhol, "200 $1 bills," 1962, fragment

In 1962, Andy Warhol, on his ascent to the status of a megastar of American pop art, painted, rather creatively, 200 $1 bills on a silk screen. He did not even paint each bill, but multiplied the initial batch by a special procedure. The large painting looked as a yet uncut rectangular sheet from the press of US Bureau of Engraving and Printing. In 2009, after prolonged languishing in a private collection, it was estimated at $8,000,000-12,000,000 but sold for $43.8 million at a Sotheby art auction in New York to an unidentified buyer. In the catalogue, it was presented as a "monumental masterpiece," one of "testaments to a pivotal moment in art history" and "a form of art that would remove the hand of the artist."



Andy Warhol, *Roll of bills*, 1962

At the same auction, an untitled 1962 drawing of a roll of dollar bills tied with a string, also by Warhol, was estimated at $2.5-3.5 million and sold for $4,226,500. Warhol also painted the dollar sign $. The very idea of painting numbers and signs was not new by that time.



Jasper Johns, *0-9*, 1960

Jasper Johns is recognized as one of the greatest modern artists. In the 1960's, he painted, among other mundane objects, letters and numerals. A set of his ten 27′ x 21′ color lithographs, a painting of one numeral on each (1969), was on sale at Christie's in 2014. Estimated at $400,000 – $600,000, it was sold for $485,000.

The modern greatness of the three above-mentioned modern artists is undisputable.

There is an unrivaled degree of unanimity about money on earth. There is no such agreement about human life. The world believes that money is always good and the more the better. This is, probably, the only ecumenical belief not stained with doubt, in spite of the frowning Bible with its camel and the eye of a needle.

The nominal value of a money bill is undisputable because (1) it is numerical and (2) it is printed on a solid thing that cannot change its appearance spontaneously or by somebody's wish. It is like an art print on good old-fashioned paper, not a submissive digital file to be processed in a photo shop.

Art is open to endless and irreconcilable arguments about artistic value. Money (for money's sake) is not. A number, accompanied by the same currency sign, cannot have two interpretations. That 2 >1 or 345 < 543 is always true by definition. Not many other things can

be as uncontroversial. We do not argue which day of biblical creation was which: they are numbered by Creator himself.

To deal with zillions of numbers, all we need is the distinction between MORE and LESS and the ability to compare any two numbers in those terms. If neither MORE nor LESS applies, the numbers are EQUAL. Computers run on such simple principles and teach humans not to care whether number 10 refers to people, commandments, sins, or soup cans.

In contrast, the value of an artwork other than in terms of money is never consensual and it changes with time. The money-art-value relation involves the uncertainty caused by differences between humans, as well as by circumstances. The flow of time, if too fast and turbulent, changes everything without warning.

There are strong bonds of similarity between money and art. They did not exist when images were painted on the walls of caves and temples. Paper money looks like a picture, has a signature and a unique number on each bill, and is made by printing, like artistic prints. Money is printed by billions (36.4 billions of US notes in 2014, to be exact), paintings and prints can be produced by thousands—the difference is only quantitative.

The framed "money" of art wildly differs in the value of its "banknotes." Still, by "printing" this kind of money, a few artists could make significant fortunes. Art is not a disposable stuff like old paper money. It is not in constant circulation and is protected against damage. This advantage rarely works for the artist whose life is too short. Productivity can prolong the life of the struggling artist but may not be enough to shorten his struggle. Mass production is an inspiration for any artist who, having tasted success, is sick and tired of struggling.

More lasting than ships, bridges, and some buildings, art is the closest object we can find in the vicinity of immortality.

Art can be stolen, which is never easy, always risky, and requires an artistry of a special kind. But the greatest advantage of art money today is that valuable artwork cannot be hacked! Having just finished *Future Crimes* by Mark Goodman (Doubleday, 2015), the latest compendium of cyber horrors, I begin to think that the worldwide art frenzy is driven, subconsciously or not, by a promise of digital safety. Some compare it with the Dutch tulip mania of 1630. Nonsense! Tulips perish and paintings do not. And if they did, modern art could be perfectly forged and imitated because it possesses the never before appreciated potential of ultimate simplicity and self-similarity. This is why minimalism flourishes. Am I carried away? Yes. Maybe not. Definitely.

If painting of money is art, so is paper money *per se*.

Money is designed by artists. The last French and German money before the euro displayed national creativity in arts and sciences. In the German set of paper money before euro, five out of eight bills were related to arts, and the rest to science. The 100 DM (1990) was dedicated to Clara Schumann.

The French 100 NF banknote (1998) was dedicated to Paul Cézanne, who painted hundreds of apples, alone and with other fruit, throughout all his life. It had his portrait and a reproduction of his *Pommes et Biscuits* (*Apples and Cookies*). The previous 100F (1991) was a tribute to Eugene Delacroix.

The euro banknotes follow the trend in an ingenious oblique way, showing architectural styles and bridges: the heritage and the very idea of the EU, although bridge is as much a symbol of division as of aspired connection.



Pre-euro French and German money.



Minimalist money. Germany, 1923.



20 francs, France, 1877

Illuminating the essence of art as uniqueness, paper money can be investment of the same kind as art if it is sufficiently unique. Thus, a US $1 bill with a rare number like C00000001C can cost thousand times its face value on collector markets.

Classical art was like gold: it was difficult to mine and born miners were rare. With the advent of the Industrial Revolution, demise of aristocracy, rise of mass production, growth of middle class and free professions, accumulation of "new money," spread of media, photography, and kitsch, intensification of urban life, the long centuries of classical monumental glory looked overshined by the coins given to Monet for his *Asparagus*.

Art had to undergo some adaptation in the spirit of Industrial Revolution, pick up some soot and dust, and mangle the freewheeling sophistication of natural forms to fit the minimalist geometry of engineering. The mutant and mutinous experimental monsters survived and became mainstream after a historically short fight. The gates opened wide to new art, not photographic, not traditional, easy to make, in abundant supply, but extremely unequal in its market value, with a very narrow flat top of a Mexican-style pyramid where big money was changing hands. In the age of advertising, the novelty and apparent absurdity of extremists worked well for the art as the whole.



The new way of making art more difficult to mine and keep up its value was to let artists compete in running up to the top of the pyramid of success, which is what markets are for, indifferent to what exactly you are bringing to marketplace, just bring your rank of

success. Modern art is the product of modern competitive business, i.e., the interplay of productivity, supply, and demand, with each of the three capable of being manipulated. The artists, accomplished or potential, were reassured: "You can make it. Even if you are not Leonardo da Vinci, you could be compared to him and treated likewise."

Art remained elevated to the spiritual realm and surrounded by a tribe of worshippers, but the spirit was changing, it seems to me, toward a kind of Paganism—the most democratic religion of all, in which you choose, woo, and pet your god and no distant absentminded God decides whether to punish you or reward for your uniqueness or ordinarity.

Elite can exist only on the shoulders of a big crowd. With the intoxicating vapors of luck and lottery in the air, competition animates promotion, patronage, publicity, and polemic. An establishment of experts grows between the artists and the public. Art expertise and sales becomes art. Art becomes economy. Art comes closer—but not too close, not too sweaty—to sport.

> Does art market duplicate stock market? There is an ongoing discussion on this subject. The difference between art market and stock market is obvious but not overwhelming: absence of volume (exactly one item at an auction—not one thousand identical copies) and absence of an objective measure for the value of art. Yet there is a curious similarity. Both business companies and artists have the so-called intangible (non-monetary) component of the valuation, which is mostly guesswork. For example, in case of Apple, Inc., it is its reputation, fame, rumors, ego, and its performance art of self-presentation. In case of art, everything but sales history is intangible: reputation, fame, rumors, ego and theatrics. Although the demand for art is miniscule, regarding the number of buyers, liquidity in times of affluence seems unlimited, while the term "liquidity" does not make full sense: the acquired piece will not be resold with any immediacy.

Alchemy does not work with gold, but it works wonders with art. Andy Warhol formulated the law of art alchemy this way:

> "Well," I said, "it doesn't mean if you don't believe in nothing that it's nothing. You have to treat the nothing as if it were something. Make something out of nothing." (*Philosophy of Andy Warhol*).

The "nothing treated as if it were something" is what I call *nexistence*.

The art transformation happened not because there had been any ideology and leadership. It happened because (1) mutations of the classical canon had been accumulating, (2) photography had taken over the pictorial function of art, (3) expansion of free professions had created the audience with a feedback, engagement, influence, new tastes, and new wallets, and (4) a new canon, a new DNA, loosely summarized as ART IS ARTIST'S SELFIE or MAKE SOMETHING OUT OF NOTHING, turned out viable. Every artist can paraphrase Louis XIV, "*L'Art, c'est moi*!" Every beholder of art can say the same (I can), but that will be the subject of ART AS MIRROR, where I will promote the viewer's own *L'Art, c'est moi*!

Anyway, modern art is among the most benign area of human activity and its freedom is unrivaled. Unlike medicine, it is not marred by side effects. You can take it in any dose or not at all.

I cannot expand here in this direction because I am neither art expert nor art enthusiast. My main interest is to "understand the world," as Ulf Grenander formulated it, in terms of patterns, not facts. Art is part of the world and I am trying to understand it on my terms. The good side of this undertaking is that I begin to see myself better, although not in a better light, while I see art in a better light, although through tinted glasses.

The realm of patterns, similar to mathematical formulas, only with the sign of similarity instead of equality, is unlike the solid, detailed, and provable professional knowledge. The patterns are small, simple, long living, indifferent to interdisciplinary borders, and cheap. The latter is, probably, the main detractor of their appeal. Can you get a grant for studying the Everything? If you can, wouldn't you need the whole Fort Knox for that?

Patterns emphasize not just similarities but also differences. I do not expect professionals to welcome pattern thinking: that would undermine the value of expert knowledge the same way photography had undermined realistic painting. But do not worry about realists: they turned to hyperrealism to make their own work difficult and have achieved stunning, even if ← disturbing, results.



Ron Mueck, "Mask II" 2001-2. Photo: John Haydon

Traditionally, art should be "mined" by manual labor requiring rare skills, complex techniques, expensive materials, and significant time. It was not intended for resale but could be given as a gift, and could linger for centuries in churches, palaces, and private buildings as part of personal wealth and memory. The difficulty to mine it from the canvass or a block of marble was a large part of its value, the rest being the ability of viewers to recognize the source of content: personality, character, story, nature, thing, situation, parable, illustration, abstract idea. In other words, art was inseparable from craft and reference to something outside art.

While art had been undergoing transmutation from gold to "fiat," a similar process happened to money. Most money today does not exist either as animate or inanimate matter: it is a **state** of atoms in microscopic grains of matter stored by some institution: bank, mutual fund, brokerage, etc. Unlike matter, which cannot be easily created or annihilated, the **state** of a tiny spot on a magnetic tape, disk, or chip not only can be changed practically effortlessly, but also changed back and forth as many times as the manager (or a hacker) wants. And not only back and forth: it can wander all over the numbers from zero to trillions and more (I do not believe in infinity). This is something unprecedented in nature. Try to curl back an uncurled staple. Reversibility is unnatural. Patterns of history, however, are reversible, as modern Russia exemplifies. The American North-South divide persists today as the Blue-Red one: it is the pattern of divide and, if you want, the Abrahamic religious divides—there are quite a few of them—could be examples on a global scale.

A number as big as 1,000,000 is just a lineup of just **20** such spots: 11110100001001000000. It is still a **small** system and it can be brought into any of its 2^{20} states with just a few finger taps. You cannot do such things with large natural objects and systems. Nobody can turn a $1 paper bill into $2, although you may believe it is the essence of business.

Money today is information plus the ability of the government to keep it truthful. Information today is nothing like the clay tablets[67], stela of Hammurabi, or flammable books. It is just the **reversible** state of matter. The new reality and the essence of our era is that information is created and changed by a **reversible** process, with **irreversible** consequences. This has resulted in the current chaos of hacking and insecurity bringing us back to the night dangers in a medieval city or a forest road.

No one can have full control over irreversible processes typical for evolving complex systems (*exystems*). One can maintain a pattern over significant time, however, which, probably, together with the ability to change or reverse the pattern, is a definition of human power.[68] Patterns are reversible. As for such evolving systems as arts, only a few despotic regimes have shown any burning desire to control them.

Money is based on trust in the power of the ruler or government—the money artist who makes physical money. Electronic money is still a new element on the surface of the Earth. I do not see any proof that anybody has—or can have in principle —a full control over any **reversible state of matter**. If somebody has brought matter in that reversible state, somebody else can bring it back or elsewhere. Digital money is as different from the however inconvenient material money as chess position from chess figures. Can that be true about modern art, which is always—and often monstrously—material? Art is not reversible, but its value is.

If human mind is just a state of matter in the brain, it can be manipulated and toggled even though the phenomenon of memory makes the state of mind only partially reversible.

In the states of mind attuned to something existing independently from us, existence sounds alarm when we deviate from sensual perception into nexistential fantasies. In the states of mind attuned to *nexistence*, the alarm bell is silent, even if doubt—the satellite of every faith—is quietly humming.

Money is not just numbers in ten colors. The terrain of money is as varied as the surface of the Earth. It has mountains with summits in clouds, jungles full of snakes and predators, prairies, and rivers that replenish the seas of liquidity and loss, sustaining life, work, and fraud along the way. Moreover, the terrain changes from day to day or by the hour.

Money is abundant but it takes a lot of work to make, unless you already have enough of it and do not need it for a few years. Given time, money breeds money like sheep and goats, the ancient form of currency. The hedge of the sheep corral was a precursor of hedge fund.

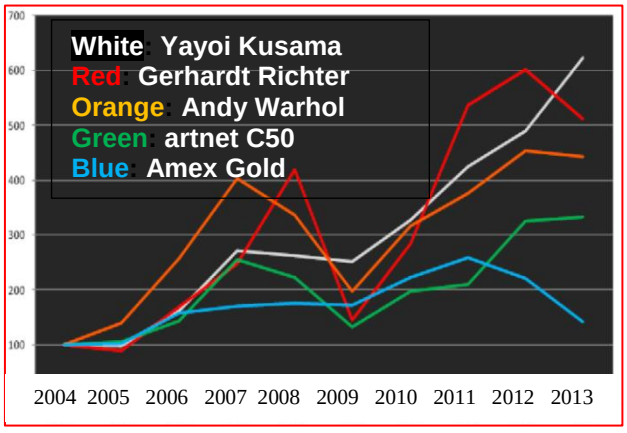
[67] Sumerian and Babylonian clay tablets were, in fact, recyclable by soaking in water: the oldest precursor of computer memory after writing on sand.

[68] Note that such definition grants to robots equality with humans.

Until recently, portraits of "money artists" used to symbolize the power of coins and bills. Money, a piece of paper with pictures, is an equivalent of power, luxury, sex, and even beauty. Power, however, is also a universal currency: the head of state and the terrorist are trading in the currency of human life and fate. There is a poignant similarity between brute power and ethereal digital money: they are cheap to put to work. Bullets are as cheap as small change and they can do their job as efficiently as taps on the keyboard. Threats can ground a giant airliner and empty the schools of a metropolitan area. One can say that digital power was the first way to operate states of matter, if "digital" is used in its original Latin meaning: made by using fingers. In human matters, the fist has been probably the very first both currency and power.

The comparison of art with money (Google "art as currency") nests snuggly in my tuned-to-patterns mind. What makes people collect banknotes, not even very old, with odd serial numbers? What makes them collect art? What makes them pay $38,000,000 for a painting of a vertical white line on a blue background? There is a whole genre of paintings presenting straight lines, vertical or horizontal, on a monochrome background. There are monochrome paintings without lines or anything else. Tom Sawyer could forge as many of them as you want and, probably, enrich the genre with masterpieces of his own. Poisoned once and forever with patterns, I see all minimalist masterpieces as just one—masterpiece, anyway. This is, probably, not the right attitude for any art lover. Am I really one? I sound like a bigot. See, money makes you lose your head like alcohol does.

Art market is an exclusive and peculiar place. Christie's art auction is a Carnegie Hall into which one cannot get by exercise.



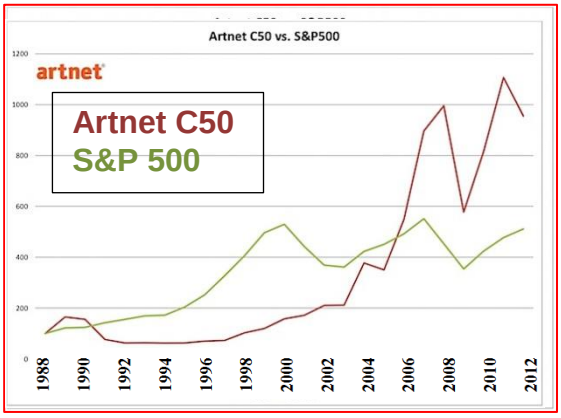


Figure 3.2. Art market. Left: artnet indexes of three artists *vs* artnet C50 and Amex Gold, 2004-2013. Right: Artnet C50 *vs* S&P 500, 1988 to 2012.

In art market, the seller does not need to persuade the buyer that the artwork will do some indispensable exciting job like Google Glass, Apple Watch, or Viagra. It has its own ticker, Artnet C50, comparable to major stock exchange indexes, and individual entries marked by the names of artists as if an artist were a company, which for some top artists is a quite exact characterization. There is a description of how the index is calculated.
Figure 3.2 shows two modified index presentations of the art market compared to market indexes of gold and S&P 500. There is a discrepancy in C50 between both, as well as a distortion of Amex Gold (HUI) index.

The crucial difference between any individual artist's index and major stock market indices lies, again, in different liquidity. Artists do not create artworks by millions and buyers of original art are not nearly as numerous as stockholders. In 2013 there were at least 600,000 mid-to-high art collectors in the world (less than 2% of all millionaires), with 36.5 million of transactions in arts and antiques and the volume of sales around $60 billion. See a sample of report.

It looks like art market is a more sensitive predictor of a coming economic bust than the leading stock market indexes. The Great Recession of 2008 was preceded by two years of stellar growth of art market. By 2015, we got the next boom. The stock market malaise of 2015-2016 is still in progress while I am writing these lines.

High priced art is from time to time bought by museums to make it public, presumably, forever. Thus, Amadeo Modigliani's *Nu Couché* (1917) was sold for $370 million in November, 2015, to the Long Museum in China, to make art accessible without going abroad, as the buyer, the founder of the museum, explained. "Forever" is another kind of nexistence, though.

Money and art are two endless topics, double endless (there are different kinds of infinity in mathematics) if talked over together.

To judge means to compare. The artistry could be evaluated by people familiar with large volumes of art accumulated over a long time, i.e., in historical perspective, against personal and public background of artist's life. This was first done on the grandest scale by Giorgio Vasari (1511 – 1574) who was himself an artist and architect. It remains the main approach of art description, with history of sales never out of sight.

The public seemed to be quite capable to appreciate art as a source of instinctively recognized beauty, which produced an effect close to physiological. This effect has always been my own yardstick for music, poetry, and movies.

I end this chaotic and exhausting, as anything about money, Chapter with the following comforting quotations from Vasari's Lives of the Artists about Raphael:

> [About the frescoes in the Raphael Rooms, Vatican Palace]. It is not possible to write of every detail in the works of this craftsman, wherein every least thing, although dumb, appears to have speech: save only of the bases executed below these pictures, with various figures of defenders and benefactors of the Church, and various terminal figures on either side of them, the whole being wrought in such a manner that everything reveals spirit, feeling, and thought, and with such a harmony and unity of colouring that nothing better can be conceived.
>
> And, indeed, among his extraordinary gifts, I perceive one of such value that I for my part am amazed at it, in that Heaven gave him the power to produce in our art an effect wholly contrary to the nature of us painters, which was that our craftsmen—I do not mean only the lesser, but also those whose humor it was to be great persons; and of this humor art creates a vast number—while working in company with Raffaello, felt themselves naturally united and in such accord, that all evil humours vanished at the sight of him, and every vile and base thought fell away from their minds.

4. ART AS REFORMATION

Something happened to European art between 1870 and 1970, give or take a few years. Let us tentatively call it the Transformation. I am sure there are dozens of theories about that, none of them simple, but I am looking for simplicity.

A big-picture way to see change is in terms of revolution—a historically fast transformation that destroys and replaces. It blocks the way back and even a counter-revolution cannot restore the past. Whatever had happened inside art—I mean, not caused by barbarians—it did not destroy anything.[69] The past remained opened to the public, treasured, cared for, and valued even more so as it was getting more distant. Art today is perfectly peaceful (reaction to art is a different matter) and inclusive to all its historical stages, styles, and inventions. Whatever monsters it creates today, they are tame and counterbalanced by the lush beauty living in the woods among dreams of good times. Art is capable of enviable acceptance and tolerance, which is its distinction from religion, but about that later.

Was art shaken up by a technological revolution around? The invention of photography and its world-shattering digitalization could have initiated a change similar to climate swings, gigantic volcano eruptions, tectonic shifts, or huge meteorites that used to re-direct evolution of species. But modern photography, as all technology, is not only reconciled with but welcomed and fully absorbed by art as just a technique. It has great achievements as independent form.

[69] Ai Weiwei's *Dropping a Han Dynasty Urn* could be an exception.

Thinking about the advent of modern art, by which I have been intrigued for a long time, I begin to understand the diversity of change as not only a succession of discrete states, like changing models on a runway, but continuous deformation in all dimensions, like a magical garment that **continuously and reversibly** changes its design, colors, and size. This is something that the computers are so good at, but what is not supposed to happen in life goaded by entropy in one direction only, and by no means into a corral.



Ingres, *Comtesse d'Haussonville* (1845)

I wonder if a physicist could say that art is like an **ergodic system**, which can pass through all its possible states, wandering back, forth, and sideways, starting from any point.

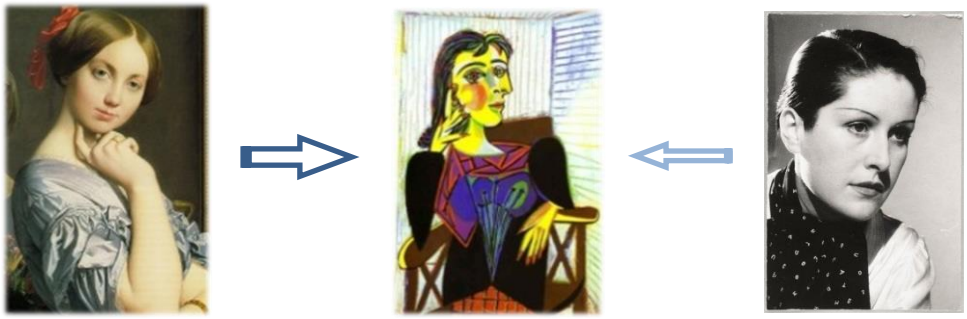


Figure 4.1. Modernization. Left to right: *Comtesse d'Haussonville* by Ingres (inverted fragment), *Portrait of Dora Maar* by Picasso, Self-photo of Dora Maar.

What exactly happened in the Transformation? I wanted to understand it since my youth but while I wanted and waited, art was running ahead, its baffling annals swelling and bursting at seams. I finally got to them when they had become available on the Web. Here I am trying to explore art in terms more visual than verbal, with the help of art itself.

I start with Jean-Auguste-Dominique Ingres (1780 –1867). In my opinion, Ingres, whose ideal was Raphael, combines the photographic exactness of detail with airy transcendence and economy in portraying beauty. Too sweet for some tastes, Ingres, in my view, represents classical painting on the brink of reversed metamorphosis: from butterfly to caterpillar. I was only slightly surprised to find out that Picasso, Matisse, Degas, surrealists, and even the stark on the wall but loquacious on the floor Barnett Newman considered Ingres their predecessor. Turns out, Newman called Ingres "abstract painter," which is not the most extravagant of his opinions. They were typically even brasher than his paintings and certainly more entertaining.[70]



Ingres, *Grande Odalisque* (1814), Manet, *Olympia* (1863).

Comtesse d'Haussonville in **Figure 4.1** is a fragment of a **mirror image** of the original painting (1845). Ingres paints the young woman as if seen with misty

70 [illegible] 969 in Barnett Newman. Selected Writings and In[illegible]

eyes. It could be also taken for a lightly airbrushed photo for an advert and accused (not by me) of an enhancement or manipulation of reality.

Ingres believed that the most important thing in painting was drawing, i.e., shape, form, and lines. Nevertheless, his *Grand Odalisque* (1814) is, allegedly, anatomically incorrect.



Plain Tiger
(*Danaus chrysippus*)

Ingres followed his esthetic ideal. The reversal of the ideal of beauty was, I believe, an essential component of the Transformation under the slogan "back to caterpillar!" Not that I deny the beauty of caterpillars! But they just repeat the same segment many times, like the minimalist composer Philip Glass.

Édouard Manet (1832-1883) was at the very beginning of the Transformation. Curiously, it was his nude *Olympia* (1863) that heralded the new era with a thunder, but not because she was nude.[71] Olympia outraged the easily excitable Parisians (who had tormented even Ingres) by her "shameless" looking straight in the eyes of the beholder. *Odalisque* had been already accepted into the family by that time. Manet suffered from hostility almost all his life. *Critical* and *hypocritical* are just one hypo apart and today more than ever.

A character in Marcel Proust's in *Search of Lost Time*, where art is also one of the main characters, witnesses the process of posthumous public adaptation to Manet, apparently, around 1898:

> But anyway the other day I was with the Grand Duchess in the Louvre and we happened to pass Manet's *Olympia*. Nowadays nobody is in the least surprised by it. It looks just like an Ingres! (Marcel Proust, *The Guermantes Way*, translation by Moncrieff, Kilmartin, & Enright**,** *Modern Library, 1998*, p.716*)*

But *Olympia* does not look like an Ingres. It looks just like a Manet. The most persistent accusation against Manet's style was that his paintings were "unfinished." I trust first impressions. That was exactly where the Transformation started.

One of the most important results of the Transformation in art was the breakup of the connection between the object or model and its image and later even with any object at all. To put it differently, art was accepted as pure unconstrained creation, a piece of matter, thing, fetish, object in itself, token, article, caprice, joke, artist's logo, coat of arms, and a tangible investment—all defined solely by its place, purpose, and function and not content. Art became pure "self-expression," an enigmatic term that sounds to me as a circular expression of an expression. Or, is it a random act on a whim, like making a circle in the sand with a stick or hurling a rock into a shop window?

Art, in all its forms, stepped through the Transformation into the ambiguous area of performance in a crowded competition for a rank and reward, both measured in numbers. This does not look

[71] *Édouard Manet: Rebel in a Frock Coat* by Beth Archer Brombert (Little, Brown and Company, 1996) is an account of Manet's life as a reluctant firebrand.

to me as unconstrained creation. It is more like business. Even if the reward is not an issue, the rank in a kind of artistic Forbes Index always is.

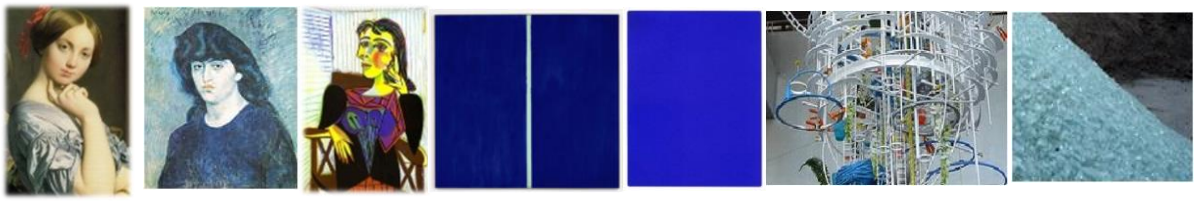
The arrows in **Figure 4.1** point to *Portrait of Dora Maar* (1937) by Pablo Picasso (1881–1973). The right arrow comes from the selfie of his model. There is nothing realistic about Picasso's image of the beautiful and passionate—in life and on her photo—woman. Still, if you see Picasso's painting, the photo, and the *Comtesse* side by side, not only some facial features of Dora Maar, but also the distilled and homogenized colors *à la* Ingres can be recognized on the picture by her deformer—in life and art—in which I see anything but love.[72] I feel like I've got really infected by artspeak.

Although the portrait of Dora Maar is not a quite typical for Picasso monstrous womanoid, the paintings in **Figure 4.1** exhibit the mystery of the Transformation better than any words: this is what happened with art, for better or worse, but why?

Revolution, mutation, innovation, liberation, reformation… I am looking for a better term and there is an array to choose from.

What happened is a much lesser mystery. It was dissolution of order, constraints, and rules without abolishing some fundamental orthodoxy of art rituals. If so, a more specific term looms as a competitor of Transformation: Reformation, *as if art were* a kind of religion. Is it? We will come to it later. "Reformation" lets you loosen your belt, pull out the tie, and unbutton the shirt, but the suit is still expected. Reformation of a particular kind, however, can also bite off a big chunk of your *joi de vivre*.

Reformation of art means looseness of order, canon, and constraint. It may lead to a greater variety and competition, encourage further evolution, and welcome freedom and equality. Reformation does not have a single human authority on earth, so that the followers of the creed can immediately begin splitting into fractions, each going to extreme in what Emile Durkheim, a theorist of religion, called *effervescence*.



1 2 3 4 5 6 7
1845 1904 1937 1953 1962 2005 2013

Figure 4.2. Reformation in blue: 1: Jean Auguste Dominique Ingres; 2 and 3: Pablo Picasso; 4: Barnett Newman; 5: Yves Klein; 6: Sarah Sze; 7: Lara Almarcegui (glass rubble).

[72] There is a remarkable in many ways website of Barbara Wells Sarudy devoted to history and evolution of pictures of women.

I present two more illustrations of the Reformation.

Figure 4.2 illustrates the process of transition from classical (Ingres) to modern art with artworks ordered chronologically. It leaves only one feature invariant in the series: blue or off-blue color.

The contrast between artwork on the left, right, and in the middle of the series is mystifying, but it can be rationalized.

I see in **Figure 4.2** the three dimensions of the art space:

(A) The scale from realism (1, 2) to deformation (3);

(B) The scale from nature (1-3) to artifice (6, 7);

(C) The scale from complexity (1-3, 6) to simplicity (4, 5, 7).

The contrast between simplicity and complexity is emphasized in **Figure 4.3.**

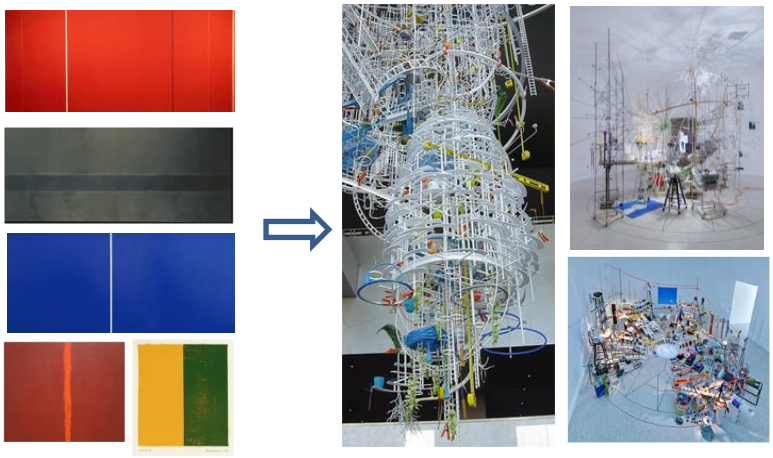


Figure 4.3. Minimalism and maximalism. Left: Barnett Newmann; right: Sarah Sze.

Once something new emerges, it evolves to its logical end until it loses vigor and becomes routine. On the scales of complexity, innovation, content, sense, size, realism, reference, chaos/order, palette, material, labor—everything goes to extremes because the extremes attract extreme attention and suggest extreme performance. Thus, one end of the scale of complexity harbors the stubborn minimalism: the distant pattern descendant of Manet's "unfinished" manner turned into mischievous laziness. It has its own extremists in monochrome painting. The other end is taken by maximalists exploring grandiosity (Christo and Jeanne-Claude) and number of **different** components (Sarah Sze). If components were the same, as in Ai Weiwei 's installations, I would call it malignant minimalism.

Entertainment is, probably, as old as culture itself. Human culture consists of two contradicting ingredients: routine and surprise. An inherent property of entertainment is its incessant novelty against the background of familiarity. Entertainment without novelty is a ritual. Ossification of novelty into ritual through imitation, self-imitation, and self-repetition, is a persistent trend of modern art. If it is little noticed, it is because the enormous volume of art is dispersed all over continents, cities, and the Web.

The essence of the Reformation was recognition of art as visual entertainment, which automatically integrated it into business. The invisible hand of art market directs the show. That means anything but equality: it is growth, productivity, and competition.

Surprisingly, the kings of the art market offer not the most original but most mundane and universally **recognizable** creations. Those are flags, numbers, anatomical preparations, vacuum cleaners, photos of celebrities and grocery, polka dot patterns, kitsch, blots, and scrawls. This is a great paradox of modern art market, as if the invisible hand was guided by an invisible eye**.** I would call this effect "anchoring." It spares the viewer of pains of imagination—the prerogative of the artist.

Modern art tends to increase the base to keep the spire well above the yearning to breathe free artistic masses. In this market, the productive simplicity has an upper hand over complexity of concept and form. The minimalist can simulate ingenuity by multiplying **identical** components (the caterpillarization) and oversizing a simple singular segment. "More, More, More," the market roars.

I have no proof of what I am saying. Consider it a hypothesis. It could be researched and tested.

Art is what is called, displayed, exhibited, bought, and sold as art. I am not yet tired of repeating this. It is the institution and environment of art that makes a thing a piece of art, not its appearance, private opinion, decree, or face-to-face deal.

This circularity ("a rose is a rose is a rose") applies to all subdivisions, forms, movements, genres, and styles of modern art. Thus, painting is what has a frame or clear borders, not necessarily rectangular (as in paintings of Ellsworth Kelly, Alan Charlton, Frank Stella), flat, or even 2D. Painting is what is called painting.

The Reformation absolved all previous artistic sins and turned them into virtues.

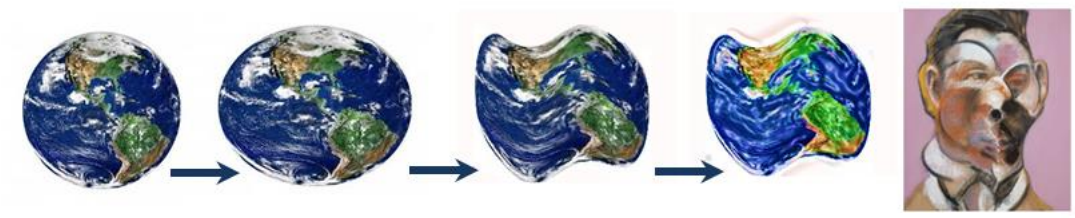


Figure 4.4 Deformation as creative pattern. Far right: Francis Bacon (1909 – 1992), one of *Three Studies of George Dyer* (1969) .

Transformation is an essential element of the Reformation. Next, let us look closer at the intimate details of transformation in art. How one **style** morphs into another? What are the innermost steps of that process?

There have been two major pattern ways to produce a modern mainstream artwork: deformation, **Figure 4.4**, and recombination, **Figure 4.5**. **Figure 4.4** starts with the picture of the globe and drags it through a sequence of Procrustean deformations of stretching, warping, and color change. Francis Bacon's painting leaves the haircut of George Dyer (1934 –1971; a few photos can be found on the Web) as probably the only recognizable feature of the model, but the rest is heavily deformed. Deformation is a canonical practice of modern art styles that preserve some ties to reality.

The abstract picture of Joan Miró *The Smile of a Tear* can be **imagined** as produced from the picture of the globe by color analysis and creating the palette of basic colors and recombined as a new picture, which has nothing in common with the globe except the hint to a blue liquid (**Figure 4.5)**. In this way, any picture, whether abstract or not, can be transformed into any other. With a minimum requirements, constrains, rules, and references to something else, all art is accommodated by a single abstract **art space**. The pattern of form is preserved while the pattern of content is absent except as a hint.

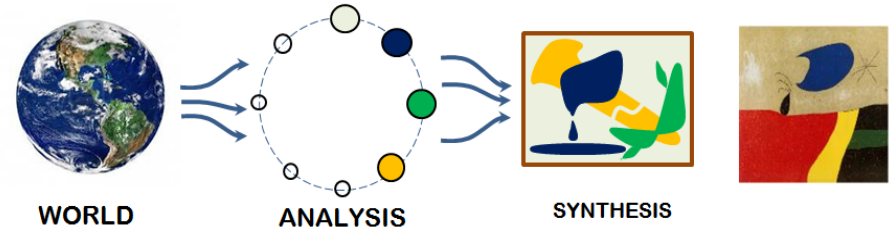
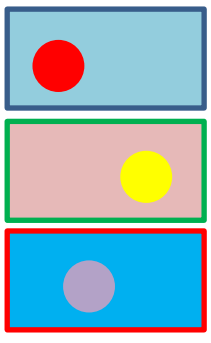


Figure 4.5. Analysis, recombination, and synthesis. Far right: Joan Miró (1893 – 1983), *The smile of a tear* (1973).

The modern artist paints not an object but a choice of rules, preferences, urges, and allusions characterized as style. He opens his bleeding heart to a consilium of shrinks. It looks like confession, but is it honest? We will come to it in ART AS BELIEF.



Artistic degeneracy

Deformation is irreversible in the sense that the artist can always deform a model image in thousands of ways, but the viewer cannot reconstruct the model from its deformation, unless there is an independent source. People in cartoons are recognizable if they are widely known and the artist controls and restrains deformations.

Recombinant art is prone to a sinister, in connection with art, phenomenon that is kosher in various fields of science: *degeneracy*. Although the corresponding adjective is *degenerate*, it is not the same as in "*degenerate art"* (*der entartete Kunst* in German) and there is no need to ward off Hitler's ghost. Degeneracy (not degeneration) in mathematics and physics means, very roughly, the situation when several mathematical objects or physical states are different, but have the same key property, for example, energy. A simple analogy is all

"degenerate" combinations of various coins that have the same total $1 value. Thus, to my artistic taste, all color combinations of rectangular bordered field with a circular spot in it have the same artistic value: they are degenerate variations. I know, artists will never agree. Sorry, folks, in my *entartete* eyes degenerate art exists. Don't look me straight in the eyes, however.

I believe that recombination is a degraded creativity.[73] Moreover, all spirals and scribbles and (I expect a lightening to struck me next moment) even all Mondrians are more or less the same for me. (It didn't! How's that?). But I also admit that in the eyes of an art collector they could be as different as Chevrolet and Maserati for a car buff. This is the moment when art tells me something about myself. What is it?[74]

[73] My old manuscript *The New and the Different* is related to this problem. Each historically "new" circle in a rectangle is different, but not new. By the way, "degraded" is also a physical term applied to energy. The latter is, of course, a term of artspeak and artistic biographies.

[74] I am overly prone to generalization. I need to be degeneralized. Or degeneratize? Degener… what a nasty word! I am too irritable, demanding, narrow-minded, and intolerant.

5. ART AS STONE

I continue the confessional footnote 25 of the previous Chapter. I am not a believer by nature or practice. I am too introverted, reclusive, and padlocked. I am too rational. I want art to "change my life," using the popular, on par with "disruptive," modern cliché, but only for a moment. Otherwise, all I want from life is to let me be myself.

In this Chapter, I compare three modern artists who have unlocked some vaults in the basement of my mind. They are formally united with the theme of stone, as well as with my instinctive attraction to their work. All three of them are women. Their styles divulge some aggressiveness, but I am reluctant to resist it.

When in 2013 I was making my first steps into postmodern art, two names drew my attention: Sarah Sze, the mute Siren who was the first to lure me into modern art with her cryptic visual gestures, and Lara Almarcegui who initially seemed to exemplify with her giant piles of construction debris all that is forbidding in art. It took me almost two years to bump into Cornelia Parker, thanks to BBC, which shows how big but insular modern art is and how much study one needs to become its educated devotee, which I am far from being one.

Sarah Sze is well represented on the Web. There was a story about her boulders in *New York Times.* They are but a small part of the enormous *Triple Point* exhibition covering, unbelievably, the entire Venice. The boulders are made of an aluminum skeleton pasted over with photos of real boulders. The artist was said to be giving away some boulders to Venice residents to put on balconies and windowsills.

My googling for the rest of Sarah Sze's creative work revealed a great diversity of her art, unexpected and surprising even after the *Triple Point*. She is an orchestral Mahler-type maximalist, but there are also quartets and solos in her chamber pieces. Diversity, variety, complexity—such qualities seduce me easily. I feel myself a kid in a toy store. Do I begin to sound like Vasari about Raphael?



Sarah Sze. Small part of exhibition at the USA Pavilion at Venice Biennale, 2013. Photos: Darren Milligan & Brad Ireland, Flickr and DOMUSWEB. See also **Figure 4.3**.

My initial reaction (close to "it can't be!!") was a consequence of my prejudice and ignorance regarding modern art, but it did not last a day. I felt instinctively attracted to the exuberant complexity, childish playfulness, and sense of humor of the artist. I suspect even some self-irony. Today, three years later, I understand that Sarah Sze's flea market art resonated with my personal life long obsession with Everything and what unifies the natures of Things and humans, as well as what makes them different. I was captivated, intrigued, and drawn to something I had missed in visual art. There was also my instinct of a chemist. I projected on the artwork my own pattern-chemical ideas. There was some rapport between my life and the eccentric creations looking at me from the computer monitor. I have never met them face to face. [75]

Then I ran into the intimidating and not less eccentric burial mounds of Lara Almarcegui, Sarah Sze's Spanish mate at the Venetian Biennale of 2013. What a contrast!

> Jean-Pierre Dalbéra, a contributor of great photos of art on Flickr, noted on Spanish Pavilion: "The pavilion is filled with a huge pile of rubble which leaves visitors perplexed and perhaps evokes the social and economic situation of Spain today."

This time I did not trust my first impression. After some research, I found out that Lara Almarcegui was interested, quite like a biologist, in the life of the cities, their youth and decay, anatomy and physiology. She "deconstructed" buildings into their primary materials and exhibited their components as piles of stone, concrete, glass, etc., the size of which preserved the ratios of the quantitative composition. That was, in my eyes, pure analytical chemistry. From this angle, the constructs of Sarah Sze now looked like molecular models of Everything. Lara's exhibition at Venice Biennale, 2013 was a decomposition of the same pavilion in which it was located. There is her video presentation of the project.

[75] The US exhibition at next Venetian Biennale of 2015 (artist Joan Jonas) and Sarah Sze's garden of the *Secret Installation* at a separate place look on the Web trivial, second hand, contrived, and tired. Sarah Sze even crudely imitated Cornelia Parker's hanging bricks, see next page. But it all should be seen live.

In my eyes, the monoculture art of Lara Almarcegui detracts from artistry but compensates for that with rationality. If abstraction is beautiful anywhere, it is not in art but in science. I can only hail such intellectual leaps. They attract me immensely. I happily surrendered to the rocky charms of the second Siren.



Figure 5.1. Lara Almarcegui. 1. Spanish Pavilion at Venice Biennale 2013; 2: Part of its deconstruction (with detail insert); 3, 4: Messe Basel Exhibition Center; 5: Its deconstruction list; 6: Exhibition at Vienna's Secession, 2010.

Truly, complexity is my catnip. Cornelia Parker's contribution to my collection of stone art was hovering between the floor and the ceiling. It was aptly entitled *Neither From nor Towards.* The stones, suspended on thin wires from a framework under the ceiling, were bricks from houses that had fell over years from eroding cliffs in Dover. They were worn smooth by the tide.

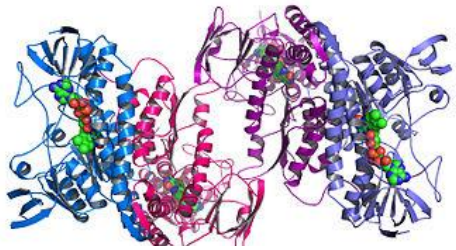


Figure 5.2. Cornelia Parker, *Neither From Nor Towards* (1992). Photos: Matt Kieffer . See also photos by Patricia Rogers.

The wire suspension has been used by the artist on a great variety of things, among them brass musical instruments and silverware cruelly flattened by a steamroller. Self-repetition is a most common side effect of artistic success and, evidently, sometimes its source and necessity. Cornelia Parker is both young enough and famous and her current projects are completely and irresistibly crazy and are "bad in a good way," borrowing the expression from artspeak.

What can the three Sirens tell the chemist who, like a frog, inhabits both parched science and swampy arts?

Sarah Sze is about connectivity, which is the very core of chemistry, music, and poetry. A structure of a complex enzyme is a finished picture (it is actually, a ready 3D installation) of what complexity is: a hierarchy of selectively interconnected units. A biopolymer is a mostly dull linear sequence the beauty trick of which is elaborate and fragile folding. Can anything in civilization have this kind of structure? A narrative, a text of a novel, a book of ideas, and a computer code come to mind. The best public speeches of Barack Obama remind of the same pattern.



The structure of dehydrogenase from *Colwellia psychrerythraea* (Wikipedia)

Lara Almarcegui is an analyst and a maximinimalist. Her piles consist of almost identical "atoms." She commands tons of solid stuff to sit in place for a short time of the exhibition. Her heavyweight art, paradoxically, both monumental, and ephemeral, is also brave and thoughtful, but it sits on the very borderline of complexity.

Cornelia Parker is quite capable of explosion, but not that of complexity. She captures in her suspended animation the fleeting moment of transformation, the "transition state," which is the main concept of chemistry of molecules and patterns. It separates initial (*From*) and final (*Toward*) stable states and is the key concept is to understanding the process of transformation of *Now* into *Next*. To my ears, however, the gagged screech of the tortured musical instruments drowns out the song of the Siren. I don't like mass murder of Things, not to mention people and animals.



Cornelia Parker at Whitworth Gallery, 2015.
Photo: Damian Entwistle

Cornelia Parker is drawn to destruction. She is about connectivity, too, but in an ambiguous way. She said in an interview : (2009): "I first started making wire **drawings** from melted-down objects because the process of making wire is called "**drawing**." She connects words, ideas, and matter. Tilda Swinton sleeping at MoMA in her performance *The Maybe* (ART AS MATTER) is another example of Cornelia Parker's convoluted associations.

The topology of Parker's inventions is unbound. Her connectivity has intergalactic range. But self-repetition begins to stick out. Why not to establish something like patent system in the modern art in order to boost sinking creativity? Thou shalt not steal, even from yourself.

There is another common theme in the three songs of stone, as I hear it. They are about off-picture humans in their by far outliving them but still mortal dwellings with their walls, foundations, naturally scattered around detritus of daily existence, and the gentle *memento mori* for which stone is used since time immemorial. (Ha! I am really under the spell of the Sirens)

The stones of the three artists—one fake, the other real, the third dead—again tell me something about myself—the subject I will return to in ART AS MIRROR , which is also about stone, in a way.



Raphael, *The Fire in Borgo*.

I am intrigued by rational aspects and implications of modern art. I appreciate novelty, inventiveness, and originality. I like the play of ideas. This is what attracts me in science. But it is not comparable with the physiological effect that music, poetry, or film and literature can have on me. In my exploration of modern art, I am driven by intellectual motives: I want to understand its origin and message. Yet the conception, gestation, and birth of art are still mostly old-fashionably human. The artist as the behind-the-scene creator or self-performer is for me the main component of modern art, not the shark, balloon dog, or even self-portrait.

The modern—and now even classical—art as a whole entertains me but rarely excites. Looking at the Raphael's The *Fire in Borgo*, I cannot share the exaltation of Vasari regarding this fresco (see the conclusion of ART AS MONEY). I have the same problem with most of Mozart.

I discern a difference between artistry and artifice. Artifice is about *what* and artistry is about *how*. Anything repetitive is artifice and everything unique is artistry. Nothing is more exciting than uniqueness and the unique evidence of a uniquely talented human.

Music and text are cardinally different from visual art. They blind out the powerful distraction of vision: that big, greedy, and egotistic part of our animal design. Text and sound are not real in the same way image is. They need a preparation, training, or gift to understand complicated music and poetry and untangle their complexity. To understand and love Rilke or Bartok is an art in itself, like the art of human relations and love.

Knowing modern art mostly by reproductions and photos, I find it preposterous, frivolous, and boring. But the more I see and the less I read about it, the more tolerant I become: tolerance comes with knowledge. Then sympathy, longing, and quiet joy of recognition might follow, like the relations with a few people to whom we feel attraction and sympathy. Our favorite artwork starts an independent life in... in… but where? It is hard to find a name for the place. Let us still reserve for arts our belief in however nexistent soul.

Somebody who stays in contact with large quantities of art, as either fan or professional, can easily acquire the same fine selective taste to it as a wine aficionado. As I said, my access to visual art was very limited for most of my life. Access to music, poetry, and literature was much wider. But in any case, the greatest market icons do not cease to repel me with a glaring absence of artistry. As Sarah Thornton put it, "an actor playing the role of artist."

Striving for objectivity, I admit that, having been suddenly transferred from Soviet Russia to America over 50 missed years of world history, I could be too conservative and pre-modern to understand the spirit of postmodernity.



Figure 5.3. Stone, canvas, and air. Left to right: Natural stone Travertino Rosso Persiano; Barnett Newman's paintings *Anna's Light* (1968), and Hurricane Patricia over Mexico, October 23, 2015, satellite (NOAA).

Figure 5.3 is just my accidental association *à la* Cornelia Parker on the theme of stone, air (its extreme opposite), and the nature of abstract art. Consider it my own derivative art, for a moment.

> Hey, aren't the vertical zips of Barnett Newman of the same blood as the wires of the stone hangers?

Art is intoxicating or, in Nietzschean artspeak, Dionysian. Here is an insightful observation that I want to quote as a prelude to ART AS FUTURE:

> This desire to make art more about experience rather than meaning makes me wonder, if modern art is supposed to be a reflection of our modern times, are we approaching a more Dionysian era in society? Is our long grown belief of Apollonian decaying to give way once again to a Dionysian way of living?

I think so. The author is Ian Heckman in his blog "Roots half-hidden" .[76]

[76] In his new artistically excellent book *Fracture : life and culture in the west, 1918-193*8 (Basic Books, 2015), Philipp Blom seems to associate the two world wars with the preceding hedonistic (what I would call Dionysian) culture after WW1. I believe we (or at least 1%) are still deep in another Dionysian phase, inciting comparisons.

6. ART AS ABSTRACTION

The advent of abstraction looks like the sharpest turn in the entire history of art. It came like a thunderbolt or wildfire—the common metaphors of artspeak. Like automobile, which left space for horses, or cinematograph, which left time for theater, it spared classical art. I hesitate to compare it with the onslaught of computers, however, until I am quite certain that they will be as merciful as art is.

Abstraction is typically defined in a negative way as "turning away" from creating **recognizable**, even if simplified, schematic, mutilated and twisted, images of real world. Other definitions sound positive, like "a visual language of shape, form, color, and line" (Wiki). The metaphor of language fits any art and science, if not everything humans do, like "language of sex" (Google: About 327,000 results, 0.26 seconds) and "language of food" (about 13,000,000 results, 0.31 sec.), but the abstract "language" has no common grammar: a mere vocabulary to which the artists apply their personal grammars. Some more cautious definitions realize that abstract, modern, classical, and any other art cover a continuum. If so, definitions lose any utility and the revolutionary effervescence fizzles.

Yet the change of the art landscape has been apocalyptic. It is as if the earth suddenly filled up with all creatures of the past and present, as well as their fragments and crossbred chimeras, suggesting an act of Invisible Hand.



Language is impossible without despotic **constraints** of grammar. Abstraction outside art is a process of formulating a single rule for a set of concrete cases, which usually reserves a place for yet unknown cases. It names many things with one name—exactly what mathematics is about. The grammar is possible because reality—and even dreams—is not completely chaotic but



ordered by strong **constraints**. Thus, an animal cannot be in two separate places at the same time and a river keeps flowing although it is invisible behind a tree.

Although scientific, philosophical and, actually, any idea is always abstract, while observable reality is always concrete, an artwork is never completely abstract for two reasons. The factual content of artwork is largely consensual: "taking Jesus down from the cross," "color dots on white background," "a pile of candies," "red squiggles," "chaotic color zones." The impact on a viewer, on the contrary, is subjective. If it is widely similar over large groups of viewers of classical art on Biblical themes, it is under the powerful **constraint** of its textual source, even if it yields to the irreverent spirit of modernity.

I understand art as a whole in terms of combinatorial configurations, which means that there are distinct components selected and connected (arranged) in a particular way. I do not think it is much different from the way Kandinsky saw it. Art is a giant salad bar of ingredients with a stack of small plates, such as a place on the wall, floor, ground, or levitation in the air. The difference between classical and modern art is that the former has constraints imposed by the object, and the latter is constrained by the personality of the artists and the extent of his borrowings from others. Deformation and recombination bridge one with the other.

I bet we can repaint any classical painting, like Velazquez' *Las Meninas*, while slightly proportionally resizing figures and reshuffling the composition, like moving the dog to the left, and some viewers would not notice the difference. It will be recognized as Velazquez or at least a perfectly classical realistic painting. Classical art preserves large blocks of reality, as if rearranging the same furniture in the room and from time to time replacing the pieces.



Diego Velazquez (1599-1660), Left: *Las Meninas;* Right: It is still Velazquez, isn't it?

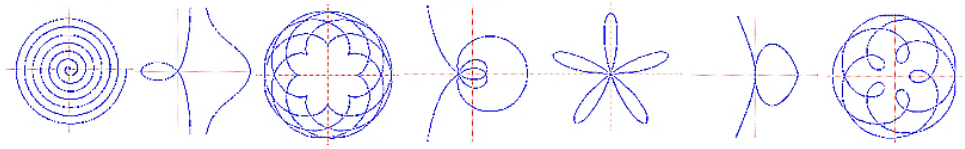
Straight line, curve, polygon, grid, circle, and square, not to mention Platonic solids, are well recognizable objects for somebody with appropriate professional background. So are arbitrary and chaotic squiggle, blot, smudge, curve, and blob.

If we **recognize** a forged cubist portrait by Picasso as … a cubist portrait by Picasso, it means that we recognize art of Picasso as a natural phenomenon. This is what the cliché "art enriches the world" means.

What makes art "abstract" is the whole image that we perceive but cannot **anchor** it in our experience because we have a different experience or none at all. Instead, we compose an associative narrative from our impressions. Unlike the artwork, it is really abstract because it exists only in our mind, as any idea. Or we can listen to artspeak instead and decide whether we trust the artspeaker as much as we trust, for example, a mathematician.

Mathematicians[77] work with a big zoo of forms and they have a refined taxonomy of their darlings. Unlike paleontologists, they have no problem with reconstruction of their origins.

Mathematics has its own abstract celebrities. They are as famous, in a way, as Warhol's *Marilyn Monroe*, although less than the actress herself. See Famous Curves Index. Here is a small selection.



Famous curves. Left to right: Spiral of Archimedes, Conchoid, Epicycloid, Plateau Curves, Rhodonea Curves, Pearls of Sluze, and Epitrochoid

Each curve is a plot of a mathematical function. It is abstract in the mathematical sense, i.e., one standing for many, because there are infinite numbers of Spirals of Archimedes, all described by the same simple equation $r = a\theta$ (in radial coordinates) with different parameters a.

There is a similarity between even most chaotic abstract art and slender visualizations of mathematical objects. They both can be represented by a set of instructions applicable to an indefinite number of images. Thus, there are websites that instruct amateurs how to paint abstract pictures, for example, *5 Easy Ways to Create an Abstract Painting*.

Mathematical regularity became a source of Op Art , which presents carefully controlled order and chaos in various proportions. Computer art is its next logical expansion and it generates images of exquisite beauty and wild intensity (**Figure 7.1**), which may suggest that regularity is the essence of beauty. Symmetry is an example of regularity. Robotic painting is the natural next step. Can the 19th century shock of photography repeat itself in history of visual art as digital shock? Well into the new era, nobody has been shocked yet. Art has a big heart.



Bridget Riley (b.1931), *Arrest 1* (1965)

Kandinsky's *Line and Point* Manifesto looks to me, with hindsight, as a prophesy of the Digital Era. Art is prophetic in a self-fulfilling way. Abstract art is the ideal task for computer with its unlimited imagination, ability produce chaos[78] and harsh order in any

[77] Relation between mathematics and art is widely represented on the Web.

[78] There is no algorithm for pure randomness and computers use it various surrogates. The pseudorandom number can be unpredictable and cryptographically secure, but randomness and algorithm are incompatible notions.

proportions, and its lack of any constraints whatsoever. The machine does not care about the real world populated with humans, and would not give a dam for the entire universe. The dimwitted humans, with their narrow-minded algorithms of instincts, their quirks, sensibilities, and prejudices, are nothing but impediment for the unbound computer creativity that only another computer can fully appreciate.

Being one of them humans, I kind of like our breed. Humans have an insatiable curiosity toward themselves and their companions. They also have an inborn but not uniform sense of beauty. I believe—no, I hope—that the future belongs to some kind of post-abstract art with a human shadow, if not human face. Not forever, of course, only before the pattern pendulum plunges into the next of its two swings. A small perk of being mortal is that we do not need to care about anything for too long.

At least put your photo on the back of the canvas, painters!

The phenomenon of **anchoring**, the visible or, mostly, hidden instinctive and subconscious gravitation of abstract art toward real world, which I have discovered, to my surprise, during my years of pilgrimage from Sarah Sze to Cy Twombly, makes me, uncharacteristically for my personality, elated. I can even go further into generalization: **nothing material can be abstract in any sense because of its thingishness.** The Thing is always concrete. I have my way of going to extremes.

Artwork, as I said, is not a Thing because it is unique and not mass-produced. Yet the gloomy maniacal self-similarity and self-repetition of some modern artists puts art right on the Thing's side of the border between Thing and thing.

There are two opposites of the term *abstract* if applied to art: concrete (factual) and real (physical). The painting is always both concrete and real, as any piece of matter. It is its meaning that can be recognized or not, and realistic for one person while abstract for another. Arts, whether classical or modern, are vast expansions of Rorschach blots.



Figure 6.1. Top row: Regularity in patterns of nature. Similar combinations of similar elements. Bottom row: the same with artistic effects of Microsoft Word.

Nature is a rich source of repetitive visual properties that can be generalized over particular cases. Simplification makes them look like abstract art.

Looking at **Figure 6.1**, I begin to think that the main property of abstract art, from its birth to current over-the-hill age, is simplification. Edouard Manet seems to be the true founder of abstract art, although I still do not know what was driving his hand, because he did not associate himself with the new wave.

What is simplification? In art, it is just minimalism, pretense, affront. In science, it is the essence of understanding. In politics, demagoguery. In philosophy, extinct. In modern life, forget about it.

I begin to think that the genre of drawing and the technique of print, which employed simplification by necessity, were among the genes of the classical art that had become dominant in modern art from the very beginning. But the primary reason for that still evades me. If I am right, modern art was a mutation developed and socially justified as Reformation. Didn't the religious Reformation start as a mutation in the mind of Martin Luther? By the logic of Daniel Kahneman, it could be classified as fallacy. For more about that, see my Essay 58: Pattern Chemistry of Rationality: All rational minds are alike; each irrational mind is rational in its own way. Its long subtitle is all that relevant.

I have already mentioned complexity over 20 times in this Essay. It is time to inquire what the term means.

Simplicity and complexity sound like two opposites, but they are parts of the same scale ranging from zero to indefinitely large values. This is why I think that there is only one parameter, complexity, and simplicity is just low complexity. It is difficult to say how high complexity of something is because different people and different professions may easily disagree.

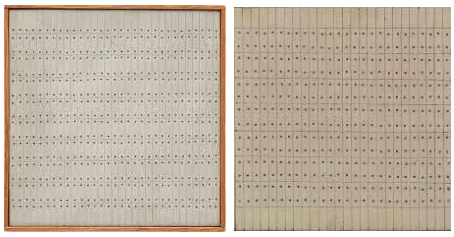
I do not believe in infinity, but I am certain that complexity is a crucial, although neglected and little explored parameter of any aspect of our civilization and human matters in general. For example, we could be interested in the size of a potential enemy's army and its armaments, have our triple numerical advantage, but if the enemy's organization and decision making is three times simpler than ours, we probably have three times less chances to win. The numbers are wild guess, but the bleak history of long American wars could have a truly simple explanation: complexity of political system. Not accidentally, the Civil War (1861 – 1865) was one of the shortest: the complexity difference between the sides was minimal.

There is the concept of Kolmogorov complexity in mathematics: object ***A*** is more complex than object ***B*** if its **shortest** full description is **longer** than that of the other. It sounds like oxymoron, but I really cannot go here into details because of the lack of consensus and my own qualifications. Strictly speaking, this concept is applicable to strings of symbols in computation, where meaning of all symbols and words is well defined.

> I think that there are problems in science that can be treated only with the inclusion of human presence and subjectivity into the picture. Anthropic principle in cosmology is an unsettling example. Pattern Theory and theories of complexity belong to this type, too. Probably, science needs a marginal Reformation: including

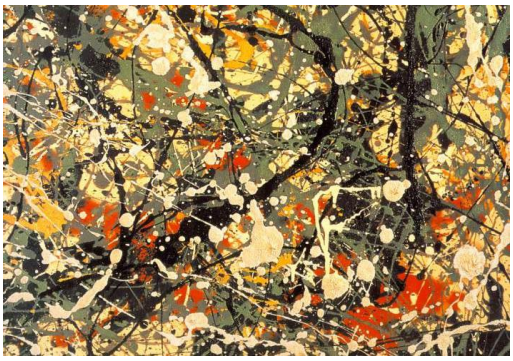
human choice into the subject. Thus, Pattern Theory requires a subjective choice of its basic terms, but no matter how exactly, unlike in cosmology. It is like choosing which of the green beans on your plate to start with.

I will jump to conclusion in the form of an example. A change in a realistic painting is recognizable and it can change artistic values of the artwork because the shortest description is really short. The shortness comes from using large blocks of recognizable information coded by short phrases, like "the return of the prodigal son" or "battle of Waterloo." Since abstract art is not recognizable, its description can be long, but most of it is artistically irrelevant. It will be noticed if the artist misses an apostle in a "Last Supper," but the existing difference between Agnes Martin's *Untitled* (1962) and *Little Sister* (1962) is not easy to notice, at least online and ignoring the frame.

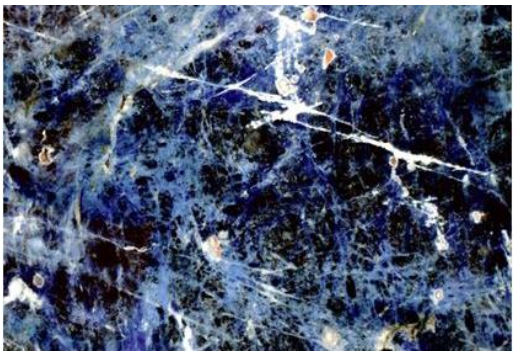


Agnes Martin, Untitled (1962) and Little Sister (1962)

Does the frame matter? The comments to *Little Sister* (1962) are eye-opening.



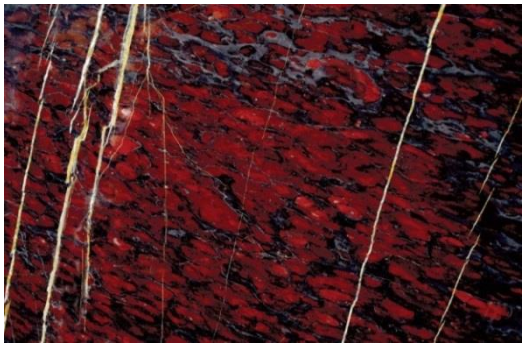
Jackson Pollock, *Number 8* (fragment)



Lapis blue granite



Jackson Pollock, *Lucifer* (fragment)



Rouge de Roi (Rouge Antique) marble

Figure 6.2. Are the processes in the depths of the earth and the brain similar? They probably are.

This example illustrates the difficulty of defining complexity because Agnes Martin is **evidently** simple and Leonardo da Vinci is **evidently** more complex. If we notice that Martin repeats the same element many times, Kolmogorov's definition looks valid, at least for modern art. This is why minimalists add intriguing but totally unrelated titles or scribbles to beef up the meager complexity. Damien Hirst seems to have all the beef in the world, but he still entitles his **shark**

in formaldehyde, which is the exact description, *The Physical Impossibility of Death in the Mind of Someone Living.* Well, I am just mean with minimalists. Verily, art is one's mirror. But aren't they mean with art?

While regularity and repetition can be seen in nature, imperfection (variability, deviation from the mean) is the main sign of natural origin. "Imperfection" should be the very essence of art that has no norm and no rules, but, curiously, even such art has an unstoppable drive toward draping itself into a flag of some style, school, or platform.

But at least Jackson Pollock is anything but simple, isn't he?

Are Pollock's paintings realistic in view of their similarity to natural stones? I do not know how to answer this except by admitting "accidental realism." I see in them a **pattern** of partially ordered natural process. I also suspect that the use of textured marble, granite, and malachite for internal decoration responds to the same human attraction to ordered chaos that was met by Jackson Pollock the pioneer and by his epigones. What is undeniable, they evoke an emotional response. Clouds and stones do that as well. Pollock's beauty is richer because it is more complex, even though it uses the same pattern all over the canvas.



Figure 6.3. Natural (not man-designed) objects. Top: Man-assisted Rorschach inkblots. Middle: Celestial objects. Left to right: Helix, Horsehead, and Great Carina Nebulae (NASA photos). Bottom: Clouds.

The most common distinction of natural objects is that they lack the strict regularity of geometrical forms. For example, they do not have perfectly straight lines, curves along simple mathematical functions, and exact symmetry. Even the flowers described by botanists by "floral formulas" are unpredictable in their details and even snowflakes are never perfect. The Rorschach blots, although tainted by artificiality because they are symmetrical, are still hardly

predictable. As for clouds and nebulas, **Figure 6.3**, they are, appropriate to say, God's blots to test our personalities: are we capable of feeling beauty and awe of the world around us? I am feigning sentimentality.



Sigmar Polke Untitled (Rorschach), 1999.

The blots are man-made but not man-designed. Their shape, however restrained by symmetry, is to a significant degree random. They can be manipulated up to a point by preparing the original splash of ink before pressing both halves of the sheet together. Sigmar Polke, an adventurer and explorer (the party for which I will always vote in arts), did that in his experiments with Rorschach blots. What bars the nebulae and clouds from entry into an abstract art gallery is our knowledge of their non-human origin. However weird the shapes of most nebulae are, they cannot be arbitrary: order is present there, too.

The shapes of blots in our hands, nebulae in deep space, and clouds over the earth have some constraints. Constraints mean order. What is the source of order?

Words like natural, unplanned, and, especially, in this context, random invite a long and difficult discussion, but I, in a Zen-like manner, will simply show what I mean.

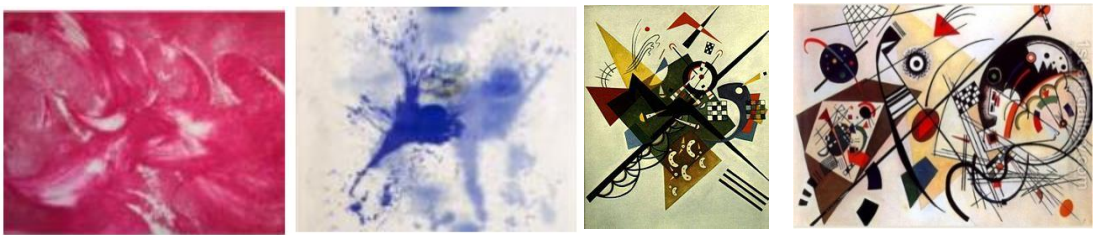


Figure 6.4. Quasi-nature and pseudo-Things
Left to right: Jean Messagier **(1920-1999),** ***Apocalypse du printemps*** **;** Hans Hoffman **(1880-1966)** ***Astral Nebula;*** **Wassily Kandinsky (1866-1944),** ***On White 2*** **and** ***Transverse Line*****, both 1923.**

In **Figure 6.4**, two left abstract nebulous pictures deliberately imitate nature, as their titles reveal. The two pictures of Wassily Kandingsky, on the right, although nebulously entitled, exemplify human artifice: straight line, smooth regular curves, and color fields within sharp borders. Somebody (myself, at least) can easily imagine the paintings as two-dimensional projections of arrays of strange but certainly man-made 3D objects piled up or spilled out on a flea market tarp. From this kind of painting a modern installation emerges, a curious hybrid of painting and sculpture, hauntingly realistic, sufficiently chaotic, and utterly irrational. With a live human as a component, sprinkled with theatre, it becomes performance art. But I have already written about that in ART AS MATTER.

I am coming back to **anchoring**. This happens when reality is unreal, too.

Figure 6.5 shows a brightened and sharpened up fragment of Andrea Mantegna's (1431-1506) *Agony in the Garden* side by side with the painting itself. I can recognize neither of them as realism. Is it because the content of the painting is mystical?



Figure 6.5. Is it realistic art? A brightened-up fragment (left) of *Agony in the Garden* (1453-1454) by Andrea Mantegna (right).

Mantegna's other paintings and frescoes often look like photos of sculpture or cardboard cutouts, which only elevates him among the old masters in the eyes of the modern ones. It looks like a modernist re-painting of a classical painting.

For a comparison, look at **Figure 6.6** that also represents the unreal.

The paintings in **Figure 6.6** depict scenes not only never observed but, from a rational point of view, as non-existent as Goya's monsters. Yet the images are realistic, even naturalistic, like a touched-up photo. In the painting of William-Adolph Bouguereau (1825-1905), the dead woman and the angels look like vigorous healthy humans. The wings of angels could be borrowed from a Victoria's Secret lingerie run. In Corrado Giaquinto's (1703 – 1765) painting of Heaven, Satan, wearing his little Halloween horns, is kneeling on a soft feather bed and looks as comfortable as everybody else in the company.



Figure 6.6. Super-realism or full-blooded nexistence?
Left to right: Corrado Giaquinto, *Satan before the Lord* (1750); William-Adolph Bouguereau. *Soul Carried to Heaven*, (1878); Bouguereau, *Dante and Virgil in Hell* (1850); Real fake wings and horns.

Bouguereau is so bound by reality that that he betrays Dante. He paints an episode from Dante's *Hell* ("one came to Capocchio, and fixed his tusks in his neck," *Canti XXIX- XXX*) as a clutch of two healthy athletic bodies, but both sinners, Capocchio and Gianni Schicchi, the attacker, are supposed to be ill and covered by itching scabs "from head to foot."

The mythical imaginary world, never observable and scantly described in texts and legends, can be painted realistically, but it means abstraction from all its otherworldly properties that we believe in.

Only up to my knees deep in modern art, I began, surprisingly, to see less contrast between classical and modern, concrete and abstract, real and surreal. The perceptions of the same art by its contemporaries and later generation cannot be the same against different backgrounds of the past. This is why modernists discovered their predecessors in classics, as the trees of art in ART AS TREE will testify. After my further wandering in modern art, some classical artists, whom I always considered paragons of realism, suddenly began to reveal to me the blotches of coming avantgardosis. I was like a medical student who finds in himself symptoms of the disease he studies.

Is modernity modern? Is abstraction abstract? What is the difference between classical and modern art? I wonder if anybody has ever tried to analyze visual art from the position of structuralism, as it has been attempted in literature. Literature cannot be reduced to pixels, but image can. It means that art could be analyzed as it is, as an image without opinions, meanings, interpretations, background, mythology, and artspeak: just a matrix of pixels.

I know that literary styles could be computer-imitated. I do not know where it would bring us with art. I am just curious. Here is a link , which is a look into the future of art. It is also the present of the art of modern CGI-boosted cinema.

Visual arts, beware computers: it is the second coming of photography. Will artists betray Kandinsky? Maybe. Warhol? Never.

Amazing…

7. ART AS TREE

Abstraction is the staple and the jewel of both art and mathematics. They are made for each other and they share the crown of imagination. Sometimes they even meet at an art gallery.




Figure 7.1. Left: Fractal art of Jock Cooper, image 1008111; right: Henri Rousseau, *The Equatorial Jungle* (1909)

Art is as concrete as matter can be even if it is abstract art. You can knock on it with your knuckles. What happens if we look at art in abstract way and try to paint the abstract picture of abstract or, for that matter, all art? Will it look as lackluster as the charts of Dow Jones or ARTNET, whatever Kandinsky wrote about the expressivity of a curved line[79] ?

[79] Investors seem to endorse Kandinsky's praise of the line. The stock chart can trigger emotions form gut fear to mad joy.

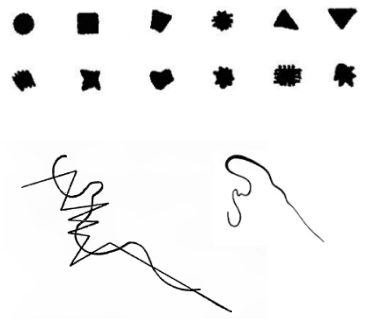
Abstraction is the job of mathematics, which turns everything, including products of pure imaginations, into clusters of abstract symbols and compositions of points, lines, planes, and breakneck surfaces that no skateboarder can brave.

The areas of mathematics that deal with lean abstract imagery of complex rich systems are graph theory, network topology, and, most importantly, Pattern Theory of Ulf Grenander. They, in a crude simplification, represent Everything as points connected with lines,[80] but here I will not repeat what can be found in original works of Ulf Grenander and on my website spirospero.net.

Instead, I will look again into *Point and Line to Plane*,[81] a short book by Wassily Kandinsky He proclaimed "points" (dots, spots, and small pictorial elements) and lines (curves of variable thickness) as basic primitive components of painting. Abstract painting, therefore, is a combination of "points" and "lines" served hot and cold, fried and frozen, mixed and pure. That book was the art's counterpart of Martin Luther's *95 Theses*.

I find philosophy and language of Kandinsky religious, otherworldly, and anti-materialistic. What followed in art looked like the opposite. The spread of abstraction has been compared to flood (some artspeakers) and fire (other artspeakers), but nobody was hurt in the free world, to which Russia has not yet ever belonged. Moreover, art has become insurance against both flood and fire—in both metaphorical and legal ways (ART AS MONEY, of course).

If the reader has not yet guessed, I am not a big fan of abstract art. Yet I confess that the sweep, intensity, and variety of Kandinsky's own paintings are irresistible. The same qualities make me defenseless against the multifaceted Picasso. But I see Andy Warhol (who also left his written Analects, if not Theses) and other modern art saints as anti-Kandinsky's counter-reformation. The worship of ordinary universally recognizable objects, like soup can, flag, dollar sign, polka dot pattern, and animal in formaldehyde is the triumph of materialism against any vestiges of idealism in art.



Points (above) and lines from Kandinsky's book

Kandinsky's points and lines are **independent** elements meaning compact "static" non-directional spots (points) and drawn-out dynamic strokes (lines) that, combined with points, imply time, movement, and process. His plane is the bounded area where the points and lines reside, sending various emotive and spatial messages. The process of interpretation is essentially the same as divination on intestines, sooth, coffee dregs, and cards, only with their pictures rather than real things. An at random taken Kandinsky is as good as cards to predict where your current love or business affair will bring you. Card and palm readers have not yet discovered that.

[80] See, for example, *History as Points and Lines* by Yuri Tarnopolsky and Ulf Grenander.

[81] Available on the Web: https://openlibrary.org/books/OL6033439M/Point_and_line_to_plane and https://archive.org/details/pointlinetoplane00kand

What I mean by points and lines is something different.
I have a good, solid, newsworthy, not postmodern but—higher up—super-modern example of what I mean by points and lines: network.

Configurations (networks) of points (elementary components, "nodes") and connecting lines (links, bonds) is exactly what the abovementioned mathematics is about. The points are neither geometrical points nor Kandinsky's points but just anything that is or is not connected to another point: people, computers, words, species, institutions, bones, nations, and thoughts. Line is not a geometrical line but a pictorial symbol of connectedness, which can also be portrayed without lines: as a matrix. This is what mathematical abstraction means: no dichotomy between the object and representation. These features are fundamental part of Pattern Theory, but Ulf Grenander took further steps by attributing to abstract configurations such realistic properties as probability and energy. The theory is radical and not yet fully appreciated, probably, because sciences and humanities are still worlds apart in both paradigms and material rewards.

Ulf Grenander's "points" (called *generators*) are somewhat close to chemical atoms but they have individuality and complexity, quite like real objects. The lines (called bond couples) are also similar to chemical bonds: they have energy: the measure of strength translatable into probability and back. There are stable configurations and improbable ones. My attempted contribution is another borrowing from chemistry: history and human relations are not just narratives and data but natural processes with beginning, transition state, and end. They redistribute the connections between points and so transform configurations. As chemistry can predict the most probable changes of structure, pattern chemistry might be a chance to foresee the future (as chemists and military commanders routinely do) without recurring to oracles and soothsayers. Do not expect market predictions, I wanted to say, but, on the second thought, who knows, maybe.

Network, the buzzword of our civilization, is a combination of points and lines connecting some or all of the points. Various patterns of connectivity (= topologies) are shown in **Figure 7.2** for computer networks in which computers are "points".

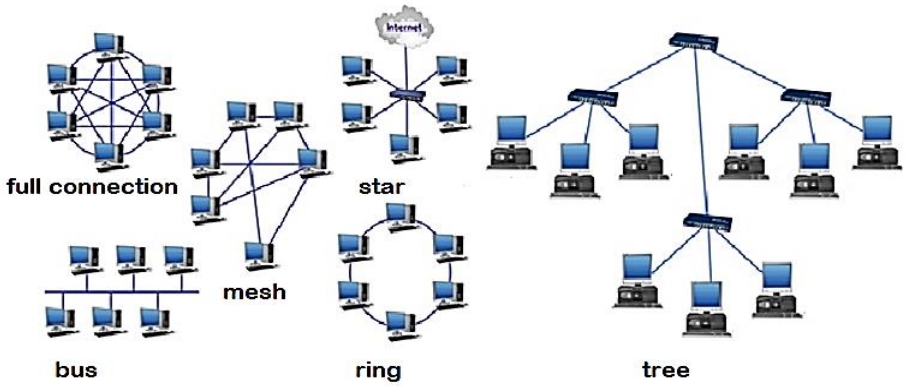


Figure 7.2. Network topologies for computers.

Culture, art, science, philosophy, politics has always been networks of communication, control, interaction, and influence. So are trade, manufacturing, and finances. Networking is a condition of personal social stability and advancement.

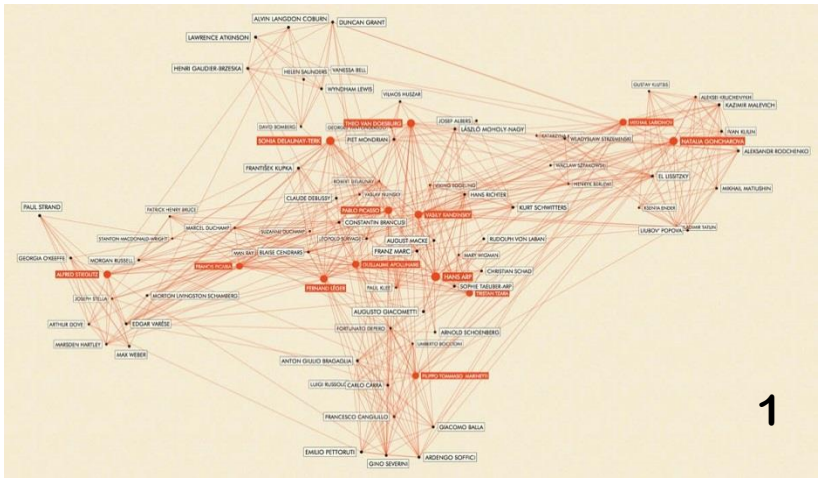
Art has a tree of its own. In 2012, the New York Museum of Modern Art (MoMA) hosted the exhibition *Inventing Abstraction, 1910-1925.*

Map 1, **Figure 7.3A**, was created with the help of network specialists. It shows links of influence and personal contacts between the artists and cultural stars of that period. Thus, it includes the poet Apollinaire and dancer Nijinsky. The most important artists have the largest neighborhoods of "friends". The amazing **interactive** (!) map places Wassily Kandinsky in the center of the entire abstractionist movement, which some enthusiasts called, testing the limits of artspeak, "our Renaissance." The Web page shows also partial art maps, all looking like a chaotic tangle of labeled spots and, sometimes, labeled lines. They represent the personalities in the nodes of the network. The maps are complemented with biographies, comments, and graphic materials retrievable by clicking on the nodes. This is a real treasure. I list major links:

1. Art history charts
2. Main page
3. Interactive main network
4. Interactive individual networks
5. Main network, pdf
6. Text



The main art network is shown in **Figure 7.3A**, but it can be fully appreciated only on the MoMA web site. It has the topology of a dense mesh of stars.



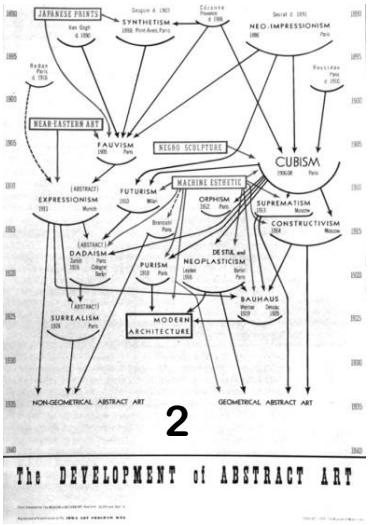


Figure 7.3A. Art maps, see ARTNEWS , *MOMA makes a FACEBOOK* for *abstractionists*, by Robin Cembalest , 10/02/12 . 1: MOMA's map; 2: Alfred Barr, 1936

The MoMA Grand Map of 2012 in "*Inventing Abstraction*" is not the only points-and-lines representation of art history as a network. The time component for it was not crucial because of the shortness of the period of flood and fire, but there were quite a few attempts to include time into the picture, as the right sides of **Figures 7.3 A** and **B** show. More art history charts could be

found on the MoMA site and elsewhere, see **Figure 7.4**. Among them, the gracious tree of Lynn Elliot Letterman, who devoted a branch to feminist art, and the super-complex tree of Greg Neville stand out. They, together with the most popular tree of Miguel Covarrubias, reflect some important **topological** distinction of art from life.

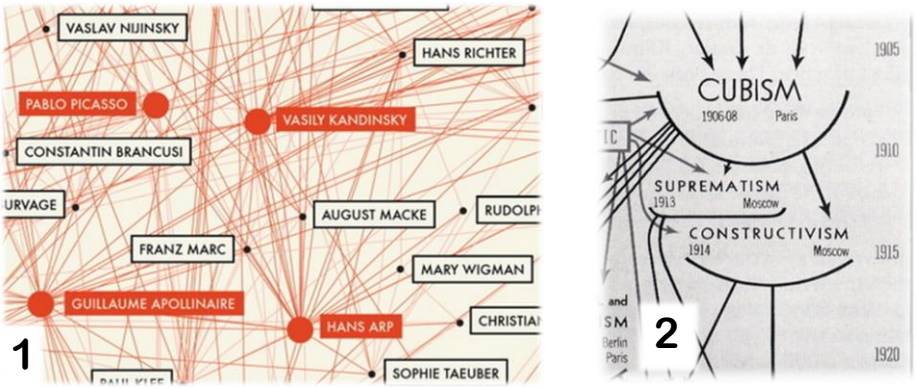
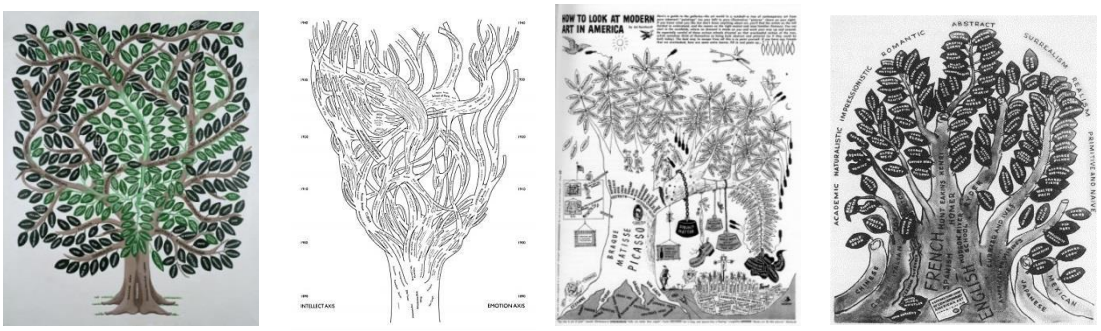


Figure 7.3B. Fragments of maps in Figure 7,3A.



1 **2** **3** **4**

Figure 7.4. Modern art trees. Authors: 1. Lynn Elliot Letterman 2. Greg Neville, 3. Ad Reinhardt, 4. Richard Pousette-Dart. Sources: 1a, 1b, 2a , 2b, 3 and 4.

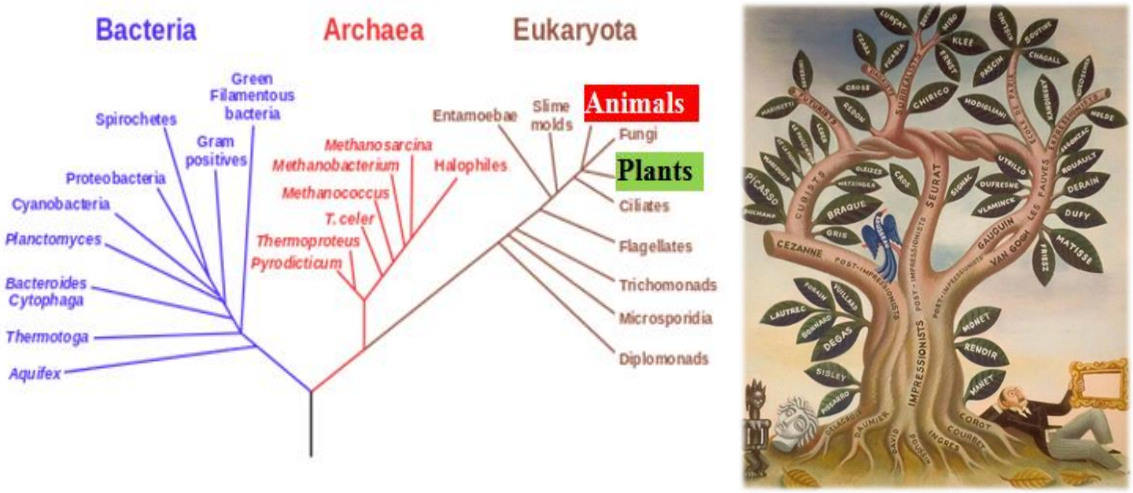


Figure 7.5. Left: Diverging tree of life; right: converging tree of modern art (by Miguel Covarrubias, 1933)

Miguel Covarrubias put Henri Rousseau on the tree not as a leaf but as an exotic bird (**Figures 7.5 and 7.6**). I wholeheartedly agree with that. I think that Henri Rousseau (1844-1910), as a promise of fresh air, still belongs more to the future than to his contemporaries. The hyperrealism and fractal art (**Figure 7.1**) look, with hindsight, like his distant and unexpected progeny. It is hard to understand why the delicate Maurice Utrillo was placed among the stark fauvists, however. The consensus in attribution and interpretation of connections in art networks is hopelessly difficult to reach.



Figure 7.6. Fragments of pictures in Figure 7.5.

Tree is the standard representation of evolution of species and other systems with growing complexity. It is also used in linguistic analysis, genealogy, history of science, technology, institutions, philosophy, ideology, and any object with hierarchical structure, apart for drawing objects of botany. Artists, who are full-blooded humans, however abstract and skeletal in their creations, as well as biologists, who are at home in a tree-house, are charting their trees growing upward, trunk at the bottom. In linguistics, they are upside down.


ring

It turns out that the evolutionary trees of art do not have the pure tree topology, which requires the absence of rings. Their tangled networks combine rings with strict branching of tree topology.

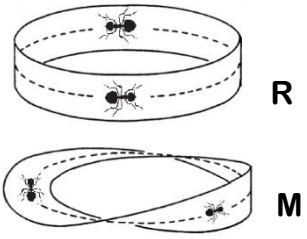
What does it tell us? Topology, unlike "network," is not a buzzword today, maybe, for a good reason, but change in topology is one of the most profound changes that can happen in the world. It does not happen every century and not even every millennium.[82] We are right in the middle of a topological revolution and I am going to allow myself a digression about the new topology of our good old round world, already with tentacles into the space.

I have been fascinated by topology since my school years.

[82] I would say, it happened only once before with the emergence of human brain in which anything could be connected with anything else. Will the future world need of humans as dumb as neurons? Joseph Stalin praised humans as dumb as, I quote, "little screws" (винтики). Will art need only minimalists? They will be easy to recombine.

Topology is a property of space, whether discrete, like network, or continuous, like our earthly habitat or something we can only imagine. The most popular illustration is the Moebius strip which everybody can make from a strip of paper.

Two ants on the opposite—inner and outer—sides of a ring can never meet without crossing the border between them. On the Moebius strip, however, two ants are always on the same side and can communicate and procreate day and night. This is like Europe and America before the Age of Discovery: the two continents were on the opposite sides of the communication border. The Industrial revolution put all humans on the Moebius strip of knowledge and physical contact. Yet we were still separated by borders (never perfect) and distance (never impenetrable) from total **mutual** manipulation and control. The Digital Revolution has thrown us all into the borderless world because the increasing part of our personal existence has been taking the eerie dematerialized digital form.



Ring (R) and Moebius strip (M)

> Dematerialization is an ugly word, but I expect it to buzz like a heavy metal band in near future. It is the main problem of the Digital Age. Its Google output today is only 347,000 results (0.57 seconds). For the times when it exceeds one million, I suggest the term "demat." Remember me then.

Let us open the phonebook, like the one that is being delivered to my mailbox—newspapers are not anymore—but sits for a year unopened on top of the fridge. The phone company maintains its network of subscribers with **potentially** full connection topology. The subscribers listed on its White Pages consist of three kinds: (A) those who know about each other's existence and have communicated at least once, (B) those who have never called each other but know about the other from the phonebook and would call in need, and (C), those who would never call one another except by mistake. This distribution changes with time: "never say never." Of course, I neither know nor want to know who is who in the entire book, but the telephone company in principle can find out from their digital records. Although hardly used, this knowledge exists openly and is of acute interest in matters of national security.



I cannot resist an urge to quote Michel Houellebecq as evidence that topology begins to slowly trickle into literary fiction, although this particular piece of fiction is chillingly realistic.

> Think of an X-Y graph, Rediger wrote, with individuals (points) linked according to their personal relationships: it is impossible to construct a graph in which each individual is linked to every other. The only solution is to create a higher plane, containing on point called God, to which all of the individuals can be linked—and linked to one another, through an intermediary.[83]
>
> Michel Houellebecq, *Submission*, Farrar, Straus and Giroux, NY 2015, p. 224.

It is the **existence of the directory,** whether on paper or in computer memory**,** that makes us all **potentially** connected, but there is no way to know the **actual** connectivity of any



[83] It is possible to construct such a graph of full connection, but impossible to realize it on a large scale. author suggests is the star connection.

network unless somebody studies it by spying or the network itself keeps the records and discloses it. The telephone company lets me know only my contacts, i.e., my neighborhood of connectivity, in which **I am a star**. We cannot know people with whom we are not connected in any way, but the directory manages to **potentially** connect us anyway.[84] What seems so meaningful to me is the absolute ubiquity and availability of **recorded** or **recordable** network data. This is the historical computer-generated novelty of modern civilization. Our souls and pockets can **potentially** be open to each other and those who watch us from afar. As for "points called gods," they are as real as you and I, but their plane is too high for this Essay. Our very existence, that we are dying to make known to the world, can be our major point of vulnerability if it is known. What has that to do with art? I will come to that in the very end.

I have no reason to believe that my cable connectivity provider uses my meagre data for anything but its business and outrageously expensive billing. Unlike many people, I also understand that absolute privacy can have very high cost in the era of terrorism.

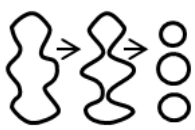
The situation is different with the enormous connectivity in the web of smart phones, Internet, and social media networks like Facebook and Google, which connect not only people with people, but also people with ideas, images, Things for sale, companies that offer them, scammers, hackers, and propaganda, stealing enormous amount of personal time—the only truly irreplaceable asset on this planet and in our lives. My **Essay 2:** On the chronophages or time-eaters was about that. Social media potentially connect everything in the Knot**: humans** (including their secret desires and thoughts)**, Things,** and **ideas**, to which disinformation and nexistence belong, too.



The Knot of Essay 59

I am not going to explore this subject any further. It is complicated (1) on its own, (2) because of connectivity to Government, (3) because of storing and exploiting the private data by the private companies, which makes privacy nonexistent, and (4) subversive connectivity between humans, companies, nations, and their enemies. This nervous system of the self-tightening Knot is still in development and the Internet of Things promises to tighten it another few notches.

The converging and circular networks are possible in human non-biological evolution because all their points exist in memory like all telephone subscribers exist in a telephone book, whether linked or not. This is the most important property of both human mind and computer which makes them to a significant degree, if not completely, potentially interchangeable. Humans and their creations are calling each other regardless of time, distance, and acquaintance. More importantly, humans have always remembered their history, real or mythical. With outsourcing history to computers, our past, present, and future can fall on three disjoined surfaces, (like three different balls) which is not as surreal as it sounds. It was described in some detail by George Orwell and made reality, for a while, in Soviet Russia.



[84] This is a very strange thing called data. The descendant of knowledge, it is the essential facet of modernity. If knowledge is your personal power, already equalized by the Web, data is the power of somebody else over you because you do not have free access to it. This is why it can be used for national security as well as insecurity.

I end here my digression with a clarification. I see the development of the current total connectivity as the unintended and uninterpretable in its time "prophesy" of modern art in the beginning of the 20th century. This is the central idea of this Essay.

By no means should this Essay be regarded as attack on modern art. I chuckle at *Untitled, 1962*, but modern art is a vast reservoir of freedom, even if canned and labeled "*Campbell Soup*." It is the opposite of what I loathe most in life.

Next, I am going to consider a different kind of a configuration with tree topology, this time about the substance of art as art. As a template, in **Figure 7.7**, I supply the tree of life with its root system never seen on such trees simply because we do not know much about the origin of life. We know, however, that all living matter consists of a limited set of atoms and every molecule in organism is just a combination of atoms. The tree of life is a record of evolving complexity of such combinations. Then what is art as artwork and not as network of personal relations? What are its atoms and molecules? This question is what unites Kandinsky's points and lines with points and lines of Pattern Theory.

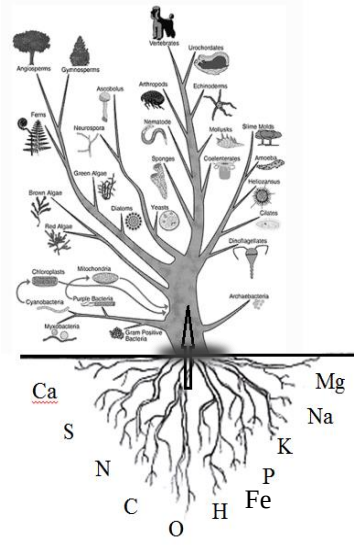


Figure 7.7. Tree of life with roots.

Modern art, unlike classical art, is not constrained by the object even in photography. It freely combines elements of reality and imagination, as well as appropriated tricks of other artists. It makes new elements and combinations, transforming the old ones.

Next, I will show yet another type of art tree: the impersonal one: the tree of styles. I will arrange it along the axis not of time but of complexity. I want to show not only how different the tree of art is, but also the consequence of this difference.

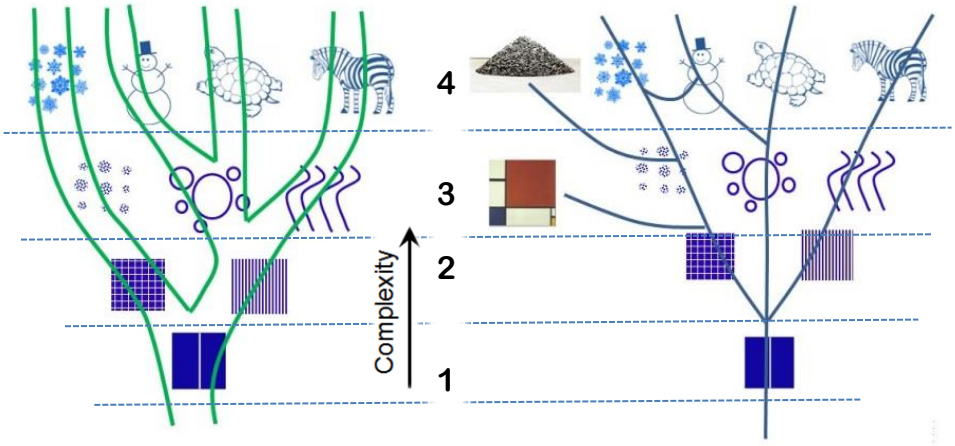


Figure 7.8. The tree of complexity

The left part of **Figure 7.8** has in its root (Level 1) Barnett Newman's *Onement VI*, a picture of extreme simplicity. Consisting of a blue field and white "zip", it opens a way to multiplication and recombination of white lines at Level 2. The lines begin to deform at Level 3, kept in shape

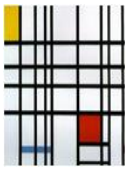
by external constraints of snowflakes, turtle, and waves. At Level 4, the primitive pictures acquire more complexity and realism. The closeness of the snowflakes to the pre-turtle makes possible, do not ask me how, the split of the turtle into the snowman and the definite turtle. The tree of complexity grows under the constraints of reality. The right part of the **Figure 7.8** adds new paths of evolution toward modern art. We see two iconic pieces: the pile and the grid of Piet Mondrian, each preserving some components of their neighbors: orthogonal grid at Level 2 and particulate consistency of snow. In the evolution of modern art, ideas are freely interbreeding with natural objects.

What I omit in the **Figure 7.8** is the long road from the primitive art through millennia and the hard toil of classical art toward becoming modern primitivism and minimalism.

The tree of complexity and sophistication is tangled. One could say that minimalism in art is similar to the minimalism of simple organisms, the germs that successfully coexist with humans. But the germs, fungi, and microscopic algae have been developing uninterrupted, while abstract art and the barrage of pop cans just fell from the skies after the ages of sophistication.



What does the prophetic art want to tell us? Is our civilization secretly exploring the ways toward the rectangular order of Mondrian-colored prison bars and windows? I will leave the question hanging in the air. I do not have either a consistent theory or sufficient material or just remaining time to think about it. Life is short.





To conclude this difficult monologue, I offer a visual parable of the current topology of art as a reformed tree, **Figure 7.9**. The topology of our art—and, I believe, of our civilization—is moving to **full connection**. Anything can be anything else and mixed with anything. Anything goes. Anything is there in the phone book/Google, just call/click on a whim. Anything but money is on a plate. Everybody and everything wears a mask and to trust the appearance and rely on promise is a risky game. It is the world of submission to order.

Art, science, technology, culture, and everything created by humans has been evolving like a tree by divergence and specialization, similarly to the evolution of living species. In our time, however, human creations and even living species are acquiring a new freedom of intercourse or repulsion between themselves. They fuse and grow cycles. The reservoir of freedom is bursting at the seams.

Everything influences and interacts with anything else. This creates a real mess in our age of artificiality in which humans, the pure product of natural evolution, have to mate with their own artifice.

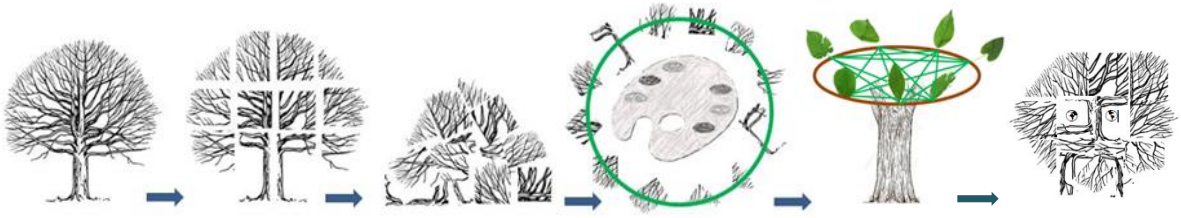


Figure 7.9. Reforming the tree of art

The watch is mating with computer, tomato with medusa, France blends with North Africa (creating huge tectonic tensions), and the Frankensteinian mix of theater, installation, artist, torture, nudity, and public in performance art is drawing crowds[85]. The diverging tree of civilization begins to converge, as if the branches of an oak started to fuse with each other. Ideas and social structures mix, too. We are witnessing the ultimate barbarity of bygone millennia coexisting today with the refinement of elites, glamor of Paris, entrenchment of liberalism, and the oxymoronic **anarcho-conservatism** of the Republican Party in US.

I have to stop and change topic before I begin to question the prospects of a reformation of life along the pattern of the Reformation of art with its artspeak and eerie art market.

[85] Marina Abramovic at MOMA, 2010

8. ART AS SHADOW

My primary assumption in this Essay is that art is an *exystem*: evolving complex system. So are life on earth, society, its culture, institutions, and knowledge. Larger exystems can have smaller sub-exystems and modern art is a sub-exystem of culture and economy where both overlap, keeping politics at safe distance.

> Exystem is a realm of individuality, while physics is, traditionally, a realm of generality. Chemistry, for which each of countless chemical structures is unlike all the others, feels at home with human individuality and needs only the generality of physics to bridge human matters with the rest of the universe, inhabited or not.
>
> I want to look at art from a very general point of view in order to understand what happened when classical art had entered its modern stage, which is now already historically old. At the same time, I expect art to reveal to me something I do not know about the larger exystem that incorporates it. I believe that all exystems have some important properties in common, which is to say that they share some patterns. This idea is not quite new. Thus, evolution of technology and evolution of life are topologically similar processes. They are represented by the same tree-like maps. This is a big and complex area, however, and I will not go there in this Essay. There is more about it on my COMPLEXITY site.

Next, I am going to explore, three-quarter-seriously, the origin of imagination by exerting my own imagination. I want to imagine myself a troglodyte, a cave dweller, one foot in the cave, the other in today. I see nexistence as the product of imagination that somehow is capable of evolving into a mass belief that moves individuals, couples, dozens, hundreds, and millions of people with hardly predictable but explainable *post factum* results. I separate dozens and hundreds from millions because the millions are usually put into action by small groups ignited by individuals. Modern art, unlike other spheres of human activity, does not enthrall many millions of people (pop arts do), but it keeps an avid eye on millions, anyway, as any industry does.

Since E. B. Tylor (1832 – 1917), anthropologists noted the possible role of dreams in the origin of religious ideas.

Dreams are not a good object to choose as a counterpart of reality. They have realistic visual details of "this world", are uncontrollable, inconsistent, overall senseless, poorly remembered, and occurring only for a short time in specific circumstances of our life. Their content is limited. They are shredded, spliced, and distorted visions of day life, composed of convincing fragments and sometimes stories (have I just formulated the essence of all postmodernity?). Dreams are passive and spontaneous, imagination is active and controlled.

I cannot argue with the power of dreams in human life, especially in past centuries. Instead, I want to draw attention to something more common and universal: the dichotomy between real and imaginary that goes through the history of art. One can say that Jackson Pollock's drip technique is fully spontaneous and has nothing to do with imagination, but Pollock definitely controlled the gradually developing picture, selection of paint, and the endpoint.

Taking to account the *unimaginable* craziness of modern art, there could have already been an artist who painted with his eyes closed. If not, there will be one.

And now let us jump not just centuries but 20,000 years (the age of the Lascaux cave pictures) back in time.

I am a Stone Age human with some emerging capacity of speech. My cave name is Ogg.

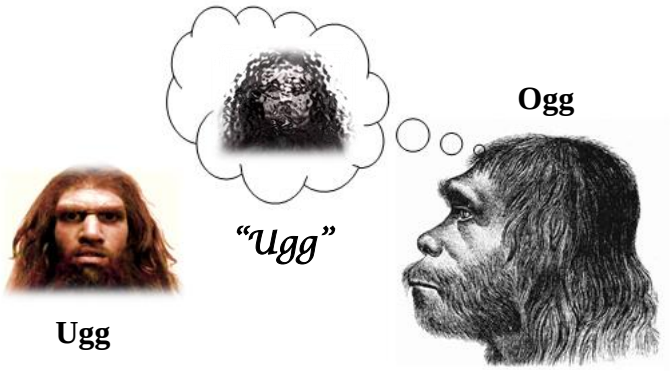


Figure 8.1. The two worlds of the first humans.

In **Figure 8.1,** I show my selfie and the shot of my good-looking pack mate and rival Ugg.[86] I look neat enough in my picture, but Ugg is really unkempt. If I look like a daydreamer, it is because I am. I will still be a daydreamer 20,000 years later.

There is a second image of Ugg, of a much poorer quality. Because it is always with me, I conclude that it is in my head, but I am not certain. I cannot look into my head. There is nothing but brains in cracked heads of other people.

The process of becoming human brought about a great complication in the work of the mammalian brain. The rest of human evolution until very recently has been spent in adaptation—ultimately, successful—to the duality of human existence tossed and torn between the real and imaginary. Man-made ideas and idea-made men created the third loop of the Knot: man-made Things.

I perceive all existing Things and life forms in two different modes. One is the mode of direct perception, WYSIWYG (*What You See Is What You Get*), or, better, WIGIWIS, *What I Get Is What I See*, i.e., I see Ugg. He is right there, I can touch him, and his presence creates his image.

The other mode is WISIWIT, *What I See Is What I Think*: I see Ugg in my imagination, with closed eyes, in other words, **I *think* about him. My mind,** not Ugg's actual presence, creates his image. Although it is **my** mind, I have some limited control over it, which I share with instincts. They are more powerful. I still do not have any power competing with my animal instincts except for the similar instincts of others like myself. Quite often, we get physical. By way of understatement, this is called healthy competition.

[86] I have no idea why all artists portray early people as wildly disheveled, untidy, and menacing brutes. Even animals take care of themselves and groom each other.

My daytime eyes-shut mental image of Ugg is not the same as the eyes-open one. It is more like a *shadow*. It has few, if any, details, none of them exact. Although I can see the *shadow* of the wart on Ugg's nose if I want, I never pay attention to the color of his eyes because we all have the same color. I can see Ugg from behind, running, or lying on his back, yelling or growling, eating or hunting. I can even see him dead, although he is enviably healthy. I *know* that it is Ugg. The *shadows*[87] of other pack members are different, but have similar properties.



Figure 8.2. Ugg (below) and I at the tomorrow's hunt.

There is something else in my head when I close my eyes: words. I can hear them ears-open or ears-shut, quite like the *shadows*. I hear them and I can play with them a little even before I speak. I can say Ugg's name and call him when he is out of my view, behind a bush or a rock. I can also imagine (i.e., see its *shadow*) an antelope and even paint its *shadow* on the wall of the cave, appropriately arranged with other *shadows*. I can imagine an antelope killed by Ugg, although I do not see the act of hunt and the jubilant Ugg himself laying a new arrow on his bow. If Ugg was indeed dead, I would see his *shadow* same way as I see the *shadow* of Ughh, his younger brother who has been already two moons dead after being hugged by a bear.

Now I am switching back to my real self (one foot still in the cave because I want you to meet somebody else there). To my surprise, my thought experiment has shown me that the most dramatic difference between Ogg and me is a larger vocabulary and ability to read, which is not that much.

Here or there, I find myself in two distinct worlds—something Emile Durkheim (his wild look is deceiving) is considered the beginning of any religion. My and Ogg's two worlds are (1) reality—the close and explored environment of my clan—and (2) the *shadows* of reality in my head.



This is Aggie remixed by Picasso

I, Ogg, begin to perceive **reality** as consisting of combinatory elements such as head or leg of the antelope, rain or shine from the skies, and my hunting mate Ugg or my sex mate Aggie, here she is, dear.



The combinations are not chaotic and I begin to understand what keeps them in shape: the constraints of the patterns. The leg cannot grow from the head, rain never goes up toward the skies, and Aggie's portrait by Picasso is a sick offensive slander. The origin of Picasso's art is even darker than the origin of religion and you really need to believe in something out of this corporeal world to consider it art. I need a mediator—an art critic, an art investment advisor, a priest in the temple of Muses—to reconcile me with it. I am intentionally confused, playing Hamlet.

[87] The term *image* is already taken by Pattern Theory as well as other sciences and arts.

The real world requires knowledge and, ultimately, science. I do not have any power over the laws of nature, but I can use them. I trust my senses. I can connect the cause and effect. The lightning causes thunder. Gravity and wind direct rain. I observe and take a note of regularity. I dive into the world of *shadows* to fish for hypotheses and generalizations. I begin to distinguish between opinion and fact. The root of knowledge is bitter, the road to understanding is long, and life is short. My descendants' power over nature and man-made Things will possibly grow for the next 20100 years, but human power over humans will always be limited and shaky (written during the US Government shutdown by the tribe of cave Republicans in 2013).

In the world of *shadows*, I have a different kind of power (I can, for example, make Democrats win in 2016).

I begin to perceive the **shadows** as consisting of combinatory elements such as head or leg of the antelope, rain or shine from the skies, and my hunting mate Ugg, and my sex mate Aggie (who has some fabulous non-combinatory elements of her own). In my *shadows*, a leg can grow from the head. Why not?

The combinations are sometimes chaotic, but the *shadows* differ from *reality*. They have much less constraints, more freedom to divide, splice, and recombine. The **laws** of *shadows* are much looser than the laws of nature. I have a lot of power over them. Thus, although Aggie is mine, I can see *shadows* of Ugg mating with Aggie, and that does something to me, and I see the *shadow* of Ugg killed with the *shadow* of my arrow, and I feel good, although Ugg is still alive and well, (and this is the beginning of literary fiction).

Moreover, I see the *shadow* of triumphant Ugg over the *shadow* of my dead body. This is what it means: **I see the world not only as it is, but also as it can be or even cannot be.** And if all humans have two eyes, it is no problem for me to imagine and paint somebody with one eye in the forehead, or with goat's legs, or fused with a horse. And I begin to think that I am too hard on Picasso and his Aggie is a masterpiece, anyway. Along the road of *shadows* we can create images eyes-shut and we have to look out into the sunshine to see what is real. But how do we know what is **not** real?

My **ideas** (let us finally, 20,000 years later, use this word instead of *shadows*) consist of elements that can be combined and recombined along rules, but not necessarily the rules of the nature. Moreover, my first sounds can be combined and recombined into words and statements, not necessarily having anything in common with reality or making sense at all. To dream is as human as to err and to err is the usual price of dreaming.

There is the third world: instincts inherited from animals. Let us call it human nature. I put it side by side with nature because they rule over all animals, although its laws are not as powerful as the laws of inanimate nature. There is a long way from instincts to "a system of rules and guidelines which are enforced through social institutions to govern behavior" (Law in Wikipedia). This system can be etched in stone or stacked in paper, but humans like to violate it in any form if it makes them feel good.

The mental images—configurations produced by imagination—harbor everything "non-natural." There is a small semantic distance between non-natural, i.e., not observable in nature, and such potent religious notions as supernatural and unnatural. This is the area of a logical twilight where all cats are gray. If the supernatural exists, even invisibly, it is natural, and if we see something unnatural, it is natural, too. Otherwise, we would not see it. The supernatural is worshipped while unnatural is persecuted. The lack of logical basis under both notions leaves an ample leeway for the evolution of moral standards.

Back in the present, I am coming to the summary of my cave experience.

Humans imagine **new** ideas and test them against the **facts of nature**, which is the environment of the tribe. The ideas that do not contradict reality will survive. This process will produce science—the search for truth, constancy, and causality. Thus, if the earth looks flat, it is flat until proven curved.[88] The change that makes knowledge **stable enough** (not necessarily much more stable) will survive. Science is concerned with nature and consensus. Inanimate nature moves toward equilibrium. Animate nature is in a perpetual dance.

Humans imagine **new** ideas and test them against other humans, i.e., the **facts of human nature**. Some survive and stay as the laws of the tribe for as long as the tribe is stable. This route leads to culture. Change that makes the culture **stable enough** will survive. The culture that makes society **stable enough** (not necessarily **more** stable) will survive, until mortally wounded or naturally exhausted in fight with another culture. Culture is concerned with human matters and social order. Society is full of internal contradictions. In the knot of conflicting and contradicting strands of comparable power, the ideas, Things, and humans compete within and across the borders of these three domains. The more freedom, the less separating distance, the more chance of conflict, as the beginning of the third millennium testifies, as if the previous century was not enough.

Human produce **new** ideas and test them against **old ideas**. This is art: the creativity without utility (except luring a mate or a buyer). The most supernatural thing about art is that new piece just adds to the collection of old pieces and, paradoxically, its monetary value increases with age.

Modern art is based on the belief that it is art: a thing of value without utility and consensual meaning, assigned to its own marketplace and place of rest. And if it is created, displayed, and sold as art, it is art. Just believe me.

[88] I do not know what to make of the fact that, although President Obama's American citizenship is proven, it is still denied by many. My guess is that (1) denial is a form of belief and (2) the roots of beliefs are as much in the instincts as the roots of the teeth are in the jawbones. That's a pity because reason dwells just a little above the jaws. See the X-ray of a tooth in ART AS BELIEF.

9. ART AS BELIEF

In our times, the word "revolution" is slapped right and left on any new product, technology, treatment, and self-help with cries "Disruptive!" or "It will change your life!" This is what revolution is about. Revolution often changes one set of restrictions for another, however.

> I suppose that the revolutionaries are those who are capable of coming to terms with the brutality of the world, and of responding to it with increased brutality." [89] (Michel Houellebecq, *The Possibility of an Island*, Vintage International, 2007, p. 109).

This is why I prefer the word "Reformation" for the beginnings of modern art. Reformation can relax or reject the constraints and I use the term in this sense. But the term inadvertently evokes religion.

Reform Judaism is an attractive example of relaxation, but religion is a complicated and sensitive subject. If I may put sexual revolution in the same paragraph with religion, it is another example. It has already morphed into the initially non-intended relaxation of marriage and treatment of sexual minorities, although a one-way bombardment by anarcho-conservatives is still going on.



Marc Quinn, *Self*. Artist's frozen blood. (1991-…)

Like the European religious and modern wars that had ended, recently, with peace, coexistence, and increased diversity in Europe, the Reformation in art did the same without a shot, although not without some blood spilled… Relax! Blood in art is only medium or component. Check out: Body fluids in art (Wikipedia) and look up Marc Quinn's *Self* , which he refreshes up every five years.

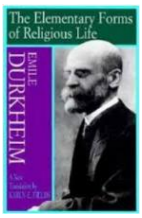
As Sarah Sze's *Triple Point* (2013)[90] shattered my outdated vision of modern art, the public seemed to be roused, too. I ran into the following theory of Paddy Johnson, an insightful and, on that occasion, skeptical art writer:

> My theory is this: The show is both a production-site and graveyard for the relics of an unnamed religion. Members of this cult worship reproduction technology and mass-produced items of any form (Paddy Johnson ; she also finds that it "looks a lot like contemporary life." *Brava!*).

[89] Houellebecq keeps modern art in the focus of his "*The Map and the Territory*," (2012), which, as well as his *Submission* (2015), I find groundbreaking.

[90] See also: A, B, and C. Photo shots from multiple points at Flickr (C) give the best representation of 3D objects.

That was the moment when I decided to retrieve Emile Durkheim's *The Elementary Forms of Religious Life*[91] from the back stacks of my bookshelves.



I had bought Durkheim's book long ago for $3.99 at a book sale but was never able to read more than two first chapters. Only when I, jolted by *Triple Point*, had made another, more successful, effort, I understood that it should be read backwards, starting with *Conclusion* and, maybe, stopping after that.



Nexistential promises and threats.

I think that what **modern** art, **modern** ideology, and **modern** religion have in common, apart from being **organized**, is *nexistence*. I am not going as far as to generalize over *contemporary life*, however, despite of strong temptation, because we have two divergent subspecies in the postmodern *Homo sapience* with contrasting existence, as well as nexistence. Paradise, hell, salvation, Nirvana, immortality, "chicken in every pot,[92]" million bucks overnight, Communism, Putinism, Trumpinism, world domination, debt, insurance, market games, security, and the combustive tea of the zealots—all that consists of promises and threats, all of them about the future.

Nexistence—the content of a socially powerful statement without evidence and proof, **nothing treated as something**—trails behind an artwork in the form of comments, analysis, comparison, evaluation, explanation, and interpretation. Unlike the nutritional value of a new sandwich or the magic abilities of the next iPhone, it is impossible to check whether the comments make any sense. There is no universally recognized connection between what we see and what we read and hear.

Nexistence is a necessary source of order for human society because nature has no laws for such unruly objects as humans. They are capable of creating novelty, which disobeys algorithms, laws, and the body of knowledge. Throughout the universe, nature prefers to bar the lawless novelty from entry into the world by keeping the immutable laws of nature on the book—unsuccessfully, as I submit, in case of humans. The only law that nature can offer humans is death and we are not happy about that, fighting nature with arts and other long lasting stuff—a kind of pillow fight because nothing lasts long in our time, especially if digitalized.



All human matters—at home, at work, in temple, or on Wall Street—involve belief, which, alloyed with doubt, trust, and desire, is a driver of human behavior.

Belief is what pulls people together in crowds and pits them against each other in fights.

[91] Originally published in 1912. Translation by Karen E. Fields, The Free Press, 1995

[92] "A chicken in every pot" was promised by Henry IV of France, Catherine the Great of Russia, and Herbert Hoover of the USA.

Reason needs to believe in itself in order to overpower a false belief. Two incompatible beliefs can play seesaw.[93]



We can believe in tomorrow's rain and believe that global warming is nonsense. While attending temple, performing rituals, and choosing martyrdom are verifiable **facts** of behavior, an individual **belief** is not verifiable because of the non-yet-existing future as its constituent. Moreover, a declaration of belief can be simply an expression of the current mood, state of mind, calculation, and intent. Trusting a promise, or dreading a punishment can mean a different, belief, deeper hidden, with roots in personal history.

The breakup of a link between the image (fact) and its meaning (idea) is the essence of the Reformation of art. The modern artwork and its "understanding" or "meaning" are in different universes. Image is shared but its perception is individual, quite like political statement, and this is why politics is a genre of performance art.

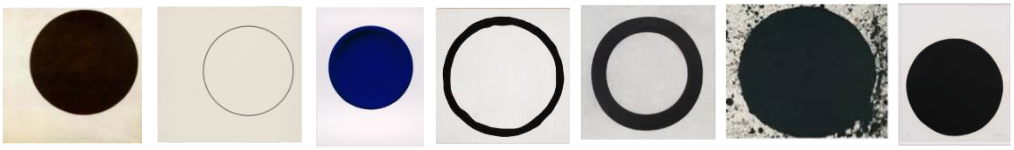
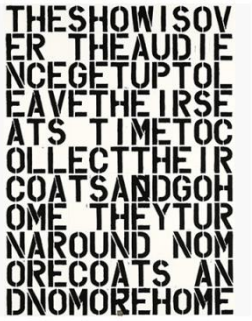


Figure 9.1. Going in circles. Kazimir Malevich, *Black Circle* , 1913; Ellsworth Kelly, *Circle line*, 1951; Ives Klein, *Disque bleu*, 1957; Jiro Yoshihara, *Work*, 1967; Richard Pousette-Dart, *Black Circle, Time* , 1980; Richard Serra, *Coltrain*, 1999, and *Billie Holiday*, 1999.

An abstract painting is a canvas with a distribution of "lines and points," some of them recognizable, but its interpretation in plain language or artspeak has no logical or semantic connection with the material reality. You can only believe in something **beyond the appearance** of a simplest circle. Your belief is personal, subjective, and it may not agree with beliefs of the artist and others. Seven circles in **Figure 9.1** (a small part of all painted circles) are another illustration to the problem of degeneracy of form as well as disintegration and dispersion of meaning. Of course, there is nothing in the tenets of modern art that requires meaning, but artspeak needs something for a subject; not the weather, really.



Christopher Wool (b.1955), Untitled, 1990.

In postmodern art, you do not need either to believe in anything, to feel something, or just to believe that you feel. To say that you *believe that you feel* is more than enough. I see in this only a cause for celebration because you, the viewer, are entitled to the same degree of freedom as the artist: the freedom of irrelevance. But I hear the gong calling for my mantra: art is what is called, displayed, feigned, played, celebrated, praised, extolled, enjoyed, loved, criticized, ridiculed, hated, and sold as art.

[93] Tamar Szabó Gendler developed a concept of *alief*, a counteracting instinctive satellite of belief, but I mean cognitive dissonance.

The difference between image and meaning is erased in the genre of "word art," an astronomically distant relative of Chinese calligraphy, exemplified by Christopher Wool's *Untitled*, 1990.

> *THE SHOW IS OVER* highlights what for Wool were the relevant questions for a young painter at the edge of postmodernism: could there still be meaning in the act of painting? The answer is at first 'No' and then perhaps 'Yes'; the work inspires a continual debate within itself. In this iconic work, Wool questions as he celebrates the tension between act and image, high art and the simulacrum of the real. (Auction comments).

Abstract art as *nexistence* echoes another *nexistence*: the future, which is, being the heart of any religion and ideology, is a matter of belief but not a matter of fact.

Belief-doubt-trust is the rock-paper-scissors game of modern culture.

Exactly because modern art is elitist, like anything in the shadow of wealth, it has the highest potential to stay away from the pressure of the crowds and carry a sincere, though cryptic, message about something concerning our civilization.

The succinct *Conclusion* of Durkheim's large volume is rather independent from the entire second-hand and often arbitrary or erroneous bulk of his book about tribal rites of Australian aborigines whom he had never faced. While reading the *Conclusion*, it occurred to me that it is applicable to a much larger area of human matters not necessarily associated with religion: collective—shared by hundreds or millions—beliefs.

Humans need beliefs as a map in wilderness, and it does not matter of what kind, as long as it makes them happy or scared. We sniff each other over for beliefs. An alien smell is discomforting for most, while the familiar one soothes the anxiety. Collective beliefs maintained by institutions are both glue and solvent of society: they unite and separate the human molecules and so keep social chemistry—or, if somebody prefers, machine—going.

> **NOTE**: I believe that belief, when proof and science are non-existing or unavailable, **is** science. Religion, therefore, was the first form of natural science. It had no alternative. Then why people sinned? Because they saw that their experiments with sin were inconclusive. They still are.

Durkheim does not use anything like *nexistence* in his terminology. He divides everything that humans deal with into two different domains: sacred and profane. Spirits, gods or God, Greek *eidola*[94], dead ancestors, demons, soul, taboos, and anything where an individual has no choice belong to the realm of the sacred. Are objects of political correction sacred or profane? Decide for yourself.

Durkheim's idea was that the sacred **beliefs** acquire their powerful organizing and uniting status because of the unconditionally believable **facts**: man-made visible and touchable paraphernalia, totems, images, narratives, art, rituals, taboos, and other tangent and transferable things existing

[94] In ancient Greek literature, an **eidolon** (plural: **eidola**) (Greek εἴδωλον: "image, idol, double, apparition, phantom, ghost") is a spirit-image of a living or dead person; a shade or phantom look-alike of the human form. (Wikipedia)

in time and space. As abstract art is instinctively anchored in reality, religious beliefs seem to be anchored in **art** of religious rituals.

The passionate belief is usually expressed in the flamboyant, forceful, and effervescent speech which itself is a form of art. You can get elated, but to take it seriously, you need to believe in what it says.

The so super-abstract that it becomes concrete *Untitled #7* (1984) of Agnes Martin,[95], consisting of 70 gentle horizontal pencil lines placed at equal intervals on white canvas (which looks pale pink on photos) has a real-life prototype: a super-concrete lined notebook sheet. I am unable to reproduce more than a fragment of the painting here because the lines are almost invisible. Her paintings of an earlier period are grids, like graph paper. Yet in the context of art:

Agnes Martin, *Untitled #7* (1984). Fragment.

As critic Nicholas Fox Weber points out, "Where there is reduction the paring down gives the object a life of its own. The work, consistently, is profoundly human, as emotive as ancient ruins, ineffably rich behind the apparent leanness." (N. Fox Weber, *The Hannelore B. and Rudolph B. Schulhof Collection*, New York, 2011, p. 11). This sense of humanity is clearly present in the horizontal bands of *Untitled #7* whose human scale and meticulously executed painterly surface exude a serene calmness that is contained within the very best examples of the artist's work. Source: Catalogue Essay .

A number of people have left evidence of their admiration of Agnes Martin's art. I cannot dispute their sincerity and have no reason to distrust their judgement. Yet I am sure no one can find ineffable richness on the front of the painting and there is only the lean signature and date "amartin 84" on the back.

Here is my major problem with belief.



Coliseum : a model of soul.

"Do you really believe that you believe when you believe?" [96] This triple-decker question, which I want to ask each time when I hear "I believe," I also ask myself, but my "I believe" means only "I guess," whether rightly or wrongly, with or without some rational arguments.

I know that my behavior is shaped by my beliefs, but how I act is always a result of the triple wrestling match between my belief, doubt, and trust, with logic as an absentminded referee. I suppose, this is what happens in everybody's ***soul***—a kind of the Roman multilevel Coliseum where gladiators and convicts fought animals and each other. Like the Coliseum, human soul has its visible from afar arcades and a hidden underground seen today in the ruins, where people and animals were waiting for their entrance onto the arena.

[95] Estimated at $2,500,000 - 3,500,000, it was auctioned for $4,197,000 in 2015.

[96] Is "I don't believe" also a belief? Norman Lewis: "I don't believe in belief"



Speaking about animals, a fleeting *shadow* has passed through my mind. In the animal shelter of an art gallery, the *souls* of the confined artists look from the canvasses at the passersby in hope to find a master who would believe in them and take them home. (Myspeak! See how easy is that?).

To accept the "never believe a belief" is too cynical. Beliefs in the right and wrong are usually real. They could be too weak to guide our actions, however.

Collective beliefs envelop an invisible, intangible, and undetectable body, like in inverted *Emperor's New Clothes*: emperor's new body. In the midnight of reason, you can be killed for wrong colors of your necktie.



Every belief, individual or collective, is ultimately about the future. Every ideology and every religion I know—with economics balancing between ideology and science—is a promise of a future reward or loss, punishment or prize. So are every political promise, spiritual movement, self-help guideline, nutritional fad, cult, current medical craze, and all advertisements, many of them truthful. The hallucinatory future throws the equity market, on which the wellbeing of many people now depends, into its tremors and bipolar swings.

The past can also be a matter of belief, but it cannot be changed, unless in the future, as the ideology of German past and Russian present illustrates.

There is a future, but the future **does not yet exist**. The invisible **future** fills up the visible clothes of our civilization with promise and threat. In a more than metaphoric way, the global economy, including the abattoirs and meat grinders of the African and Middle East wars, makes and packs the future like frozen hamburgers. But what does it have to do with art?



Filling in X-rays

Modern visual art is a mysterious domain of human matters. It cannot quite fit the Knot of Essay 59 . It is a peculiar and utterly human strand of the Knot, in which ideas and Things are inseparably interwoven. There is something in art that becomes visible in modern times not as presence but as absence, like a cavity in X-rays. It is not an empty space, however: there is a filling made of something that I call *nexistence.*

Nexistence is a very strange thing. Does nexistence exist? Obviously, touching religion, I am asking for tooth pain.

Without the fetters of matter—something shared, visible, audible, wearable, or touchable—spirit can escape, evaporate, and join the clouds in the sky because airy thoughts dissipate, mutate, and recombine at the speed of fruit flies, if not molecules. Clay, papyrus, and parchment were the first sticky papers for catching thoughts, later to be bound between the covers of books.

Artwork does not promise any particular future, except some resale value, nor has it anything to do with social order and political structure of power. Still, there is a subtle and amusing similarity between modern art and religion as Durkheim saw it. It can be seen in modern secular

creeds such as movements for freedom, justice, and equality. The problem is that when you deal with **nexistence**, your enthusiasm, imagination, and creativity can focus on **existence** with a limitless intensity. This is what modern art demonstrates: anything is possible, anything goes, and anything sells (but not "everything goes" and "everything sells"). Modern art, lodged between flea market and stock market, is full of effervescent and exuberant extravagance. Becoming a professional revolutionary, you have to show more and more brutality in your art, pierce your canvas with a knife, burn it, or bleach the canvas to kill all germs of visual appeal.

Here is one of Durkheim's most important reflections and an example of what ritual pattern—or pattern in general—means. I quote:

> Nowhere can a collective feeling become consciousness of itself without fixing upon a tangible object; but by that very fact, it participates in the nature of that object, and vice versa. Thus, it is social requirements that have fused together ideas that at first glance seem distinct, and through the great mental **effervescence** that it brings about, social life has promoted that fusion (page 238; see? I have read more than the Conclusion).
>
> We have seen, in fact, that if collective life awakens religious thought when it rises to a certain intensity, that is so because it brings about a state of **effervescence** that alters the conditions of psychic activity. The vital energies become hyper-excited, the passions more intense, the sensations more powerful; there are indeed some that are produced only at this moment. Man does not recognize himself; he feels somehow transformed and in consequence transforms his surroundings.
>
> To account for the very particular impressions he receives, he imputes to the things with which he is most directly in contact properties that they do not have, exceptional powers and virtues that the objects of ordinary experience do not possess (page 424).

Figure 9.2 illustrates a new global ritual often observed during street riots. Its pattern roots go back to human heads on spears, the ritual which, slightly modified, is still practiced by Islamic terrorists.



Figure 9.2. An effervescent riot ritual: overturning a bus.
Left to right: UK, 1981; China, 2005; Senegal, 2012; Egypt, 2013; Ukraine, 2014.

Modern art is the riot that has become norm.[97]

In the context of time, the *Black Circle* , *Black Square*, and similar paintings of Kasimir Malevich (1878-1935) in which the title is an exact and full description of content, look like a peaceful exercise in overturning a bus. The pattern of overturning covers the emergence of abstract art, which at the age of maturity takes the form of painting and framing the titles alone.

[97] This my formula is inspired by the best explanation of the historical pattern of Russian history that I know, first formulated by Marquis De Custine (1790 – 1857): martial law that has become norm.

For a pattern hunter like myself, any similarity is a fair game.



"This is how we punish the traitors," French etching, 1789

What I have unexpectedly discovered looking at modern art is that beliefs are plastic as much as rigid, stubborn as much as adaptive, dull as much as chameleonic, and conservative as much as forward-looking. They can outlast the climatic waves of fashion like grass rising after the waves of frost and drought, and they can vanish like the morning dew. They are deeply and imperiously entrenched in existence, giving it shape and structure, but taken out like a sea snail from its richly adorned conch, they display a slimy body shrinking under the sun.

Art as (almost) religion is a recurrent theme. Albert Einstein considered both branches of the same tree. Here is my most recent catch:

> *Art is almost like a religion. It is what I believe in. It is what gives my life dimension beyond the material world we live in.* Hannelore B. Schulhof.

It is usually "almost" or "like." There is a reason why art is not religion: there is no Art but Art. There is only one Art while there are many irreconcilable religions and sects. [98] More importantly, art neither promises nor delivers you any guaranteed reward or punishment.



Francis Bacon (1909-1992) *Self Portrait,* 1971

Art in the free world is gentle, peaceful, and harmless even if it looks ugly, offensive, and threatening. Art is not supposed to hurt you, bring good luck, or have any magic powers. Francis Bacon will never jump out of any of his self-portraits the way it happened in the story by Nikolai Gogol.[99]

Like gift is recognized by wrapping, art is recognized by its settings. Even then, you need to believe that what looks like modern art is indeed art. If you do not, you may not recognize a urinal, vacuum cleaner, sleeping woman, and a pile of candies as a piece of art even on the premises of an art museum.

Although the belief, which I share, that art is what is called, exhibited, and sold as art is wide spread in the West, it is not universal because the form and content can contradict the viewer's beliefs and experience (this looks like *alief*, see footnote 38). Modern art is profoundly nonconsensual and divisive, but as forgivable as a child's prank.

All that playful evasiveness and volatility of art may cause some mistrust and need of certainty. You need some direct procedure to recognize art as art. There is an old principle "you know when you see it." When an artwork has been sold, its quality and authenticity is already of no importance and out of the question: it has been sold! *Ergo*: art. You know it when it sells.

[98] Abstract art has a commodity potential. There are web sites that sell different styles abstract paintings on order.

[99] English translation (alternative title: "The Mysterious Portrait"). Gogol (1809 – 1852) was the most quintessential Russian writer. He left a still illuminating encyclopedia of patterns of Russian life, written in all registers of beautiful language.

I suggest a version of the Turing test for art: an object should be presented to a person in an environment drastically different from that of a museum: best of all, in a dump. A painting should be without frame, on a canvass of irregular outline, moderately dirty. A sculpture has better be slightly damaged, an installation somewhat ruffled. Squeamish folks can run the test in their imagination or from a photo "discovered" in a wastebasket.

To recognize a photo as that of art, you need to identify art when it is **not yet called, exhibited, sold, or bought as art**, or at least you do not know anything about it. Can you try that on your friends? Ask them to try it on you? Please.

I need to remind here that neither anybody nor I have any reason whatsoever to launch an invective against art because art, like history or any natural accumulation of things and data, is as innocent as family photos and as blameless as the rocks we stumble upon.

Let us take an example of art known to be especially divisive and even offering some quantitative measure of division.

Figure 9.2 shows two paintings separated by 440 years but somehow linked in artspeak.

Although there is a lot of material about Cy Twombly (1928-2011) online, it is not easy to find a good reproduction of his painting *Achilles Mourning the Death of Patroclus* (1962). It can be seen under magnification , also here. Unfortunately, the Web does not reproduce the important for Twombly (as well as for Barnett Newman and others) effect of its large size, 259 x 302 cm (8'6″ x 10').



Figure 9.2. Cy Twombly, *Achilles Mourning the Death of Patroclus* , 1962, and its enlarged fragment; bottom right: Hans Holbein the Younger, *Dead Christ in the Tomb*, ca. 1522

The painting consists of two spots looking like dry blood tainted with black soil. It also has some pencil scribbles, the largest of which repeats the title. There is a short but typical story related to the impact of the painting. There are testimonies about the strong effect of the work on the viewers. Art is always ready to lend a frame for the picture of your emotional state.

The following two testimonies of two professionals seem as incompatible and irreconcilable as Christianity and Hinduism or Buddhism and Islam. This is what makes art look **like** religion.

Testimony 1.

> His [Achilles'] body is brought back to the Greek camp, where Achilles openly expresses his grief: it is this terrible scene, a magnificent example of male bonding, that Twombly translates into *Achilles Mourning the Death of Patroclus* with an extreme economy of means. Only two red shapes—two spots of this sublime and bloody pictorial mess typical for Twombly—as if thrown on the canvas and spread with hands, dominate the impressive pictorial field. Below, the crossed out pencil inscription "Achilles Mourning the Death of Patroclus" seems to suggest, by its underscored horizontality, an elusive and fleeting presence of a body—**in the tradition of *Dead Christ* by Holbein the Younger** [emphasis mine, *Y.T*]. Both exemplary and unique, with a violence as much restrained as extreme, this work has no equal in Twombly's painting.
>
> From catalogue *Collection art contemporain - La collection du Centre Pompidou, source:* Jonas Storsve, original in French. Translation is mine.

Testimony 2.

> Small children make marks on paper and then explain that this is a horse or an airplane or Mommy, and we willingly concede this; but ought we to do the same with artists' intentions? In 2005 I saw in the Pompidou Center a Cy Twombly painting titled *Achilles Mourning the Death of Patroclus,* the main features of which were a red and a black swirl of paint, the first labelled "Achilles" and the second "Patroclus": on the wall next to the painting were quotations from Twombly to the effect that this painting expressed how much he had been moved by the *Iliad*. The way they presented Twombly's remarks suggested that the curators of the exhibition were as willing to find, and as willing for the public to find, all the pathos of Achilles' grief in these swirls of paint as a parent is to see Mommy in the child's squiggle. And of course once one's imagination is set in motion, one can "discover" all sorts of "mesh" between the work and its presumed meaning – for example, between the color red and Achilles' anger, the color black and death.
>
> Henry Staten, *Art as Techne, or, The Intencional Fallacy and the Unfinished Project of Formalism*. In: *A Companion to the Philosophy of Literature,* Garry L. Hagberg, Walter Jost, editors, John Wiley, 2015, p. 424 (available on Google Books)

What is there to believe?

There is some asymmetry in two accounts. Testimony 1 is a completely subjective and self-contradicting exploitation of artspeak: "sublime and bloody pictorial mess," "as if … spread with hands," "impressive pictorial field," "seems to suggest," "elusive and fleeting presence," "both exemplary and **unique**, with a violence as much restrained as extreme," "this work has no equal in Twombly's painting," "mess **typical** for Twombly." [Unique **and** typical? A typical artspeak]

Does the author really believe his words? I wish I could see in *Achilles* anything sublime, restrained, and looking like Holbein, whose Christ is anything but elusive.

Henry Staten relies on common sense and his personal experience. He denies any interpretation except what is supported by the senses of observers and is beyond belief. But he, too, speculates:

"…remarks suggested that the curators of the exhibition were as willing to find, and as willing for the public to find…" This is belief. Or doubt.

Why do I feel the same way as other Twombly unbelievers, even though I agree that it is a bloody mess, only not sublime? Why am I so suspicious and distrustful? It is impossible to argue pro or contra and artwork without belief. What are the facts? Do I need to go to Paris to decide?

The undeniable fact is that *Untitled*, 1970 (**Figure 9.3**), an archetypal squiggle by appearance and mode of production was sold for undeniable $69,605,000. This is modern art and there is nothing to guess and doubt.[100] In spite of all controversies, Cy Twombly's paintings, including blunt scribbles on a blackboard (canvas blackened with house paint), were bought and sold for millions of dollars.

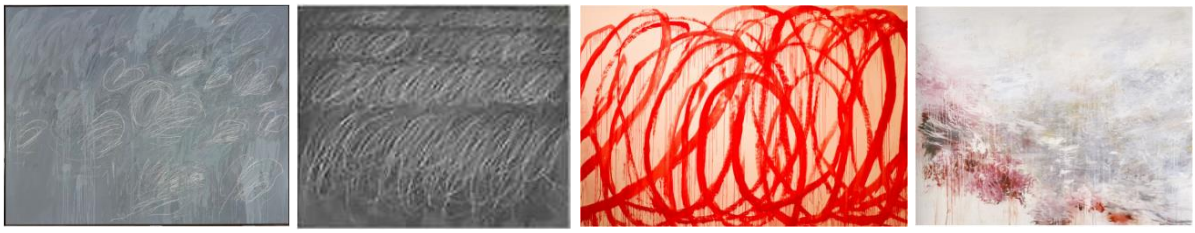


Figure 9.3. Cy Twombly (1928-2011). Left to right: *Untitled*, 1967; *Untitled*, 1970; *Untitled VIII* [*Bacchus*], 2005; *Hero and Leander* (IV; 1984). See extensive gallery.

It is undeniable that many Web denizens who visited Centre Georges Pompidou in Paris, where *Achilles* is exhibited, express their unambiguous fondness of the large painting. For example (Glen Dasilva): "Some people describe Twombly's work as scribbles. I enjoy this painting." *Bacchus* and other effusively sparse paintings of Cy Twombly also have fans in the unaffiliated public.

Twombly's obituary in *The New York Times* in 2011 had 186 reader comments. Out of 134 clearly expressed opinions, 70% were positive to the degree of adoration. I noted a religious overtone: "This type of painting is a form of advanced prayer." There was no reason for the readers to be insincere.

The diverse comments clearly clustered around two focal points. The positive comments extolled the fact of **human** achievement, a kind of *he made it*, while the negative ones looked at **artistic** achievement and found something like *he made nothing*. A few knowledgeable fans refer to Roland Barthes who wrote about Cy Twombly. Here is the orchestral *tutti fortissimo* conclusion of Barthes' article on Twombly's "scribbles:"

> TW's art—this is its morality, and also its greatest historical singularity—*does not want to take anything*; it hangs together, it floats, it drifts between desire, which subtly animates the hand, and politeness, which diminishes it; if we required some reference for this art, we could go looking

[100] Nouriel Roubini, the famous economist, the Cassandra of 2008, and art collector, finds a lot to doubt. Also, Google: "modern art" + "tax evasion" + "money laundering."

> for it only very far away, outside painting, outside the West, outside the historical period, **at the very limit of meaning**, [emphasis mine, *Y.T.*] and, say, with the Tao Tê Ching:
>
> He produces without taking for himself,
> He acts without expectation,
> His work done, he is not attached to it,
> And since he is not attached to it,
> His work will remain.
>
> Quoted from: Roland Barthes, *Cy Twombly: Works on Paper*, in: *The Responsibility of Forms*, New York: Hill and Wang, 1985, pp. 175-176. Available on Scribd.

As for the affiliated authors of lot comments at Twombly sales, they display breathtaking artspeak fireworks of truly imperial grandeur and I cannot help emitting in this sentence an art-squeak of my own.

Sebastian Smee (*The Boston Globe*) sounds ambivalent:

> Like so much of Twombly's work, it's right **on the edge of being nothing** [emphasis mine, *Y.T.*]: a desultory blackboard scrawl. Mere graffiti. An insult. A provocation. And yet, even in the context of RISD's crowded and star-studded modern and contemporary displays, it has a tendency to still roving eyes.

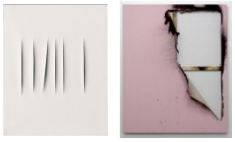
Sebastian Smee's casual impression of "scribbles" does not sound like artspeak to me. It is an observation, a fact. It can be explained and debated, while artspeak is sacred and not debatable. Sebastian Smee's intelligent and elegant obituary of Twombly is no typical artspeak either. When he points to "exquisitely perverse sense of composition," I see in *Achilles* what he means. Roland Barth can be, at best, noted and taken to account.

"To still roving eyes…" The live impression is strongly influenced by the current moment, mood, atmosphere, ambience, companions, and preceding events that could go back decades. However skeptical, given a favorable ambience and mood, I could have my eyes stilled by the two black-red spots and imagine on the remaining white field a chapter of my own life—or the whole of *Iliad*. **Two** means a lot: the foundation of human nature and all literature about it. Human nature displays between minimum two humans.

I consider Cy Twombly an outstanding—far beyond the scribbles—figure of modern art, much more diverse, impressive, intriguing, arresting, and much more interesting than his postmodern co-stars who have survived him. This is why I include his colorful, hypnotic *Hero and Leander* in the otherwise "desultory" **Figure 9.3**. I neither like nor dislike him. Details of his rich personal life are of no importance to me. He is part of history, not of my attractions.

I dislike minimalism because of my origin and background. I was brought up in a scarce world where it was believed that human labor could potentially make the world richer. I love complexity and both the process of its **creation** and the process of simplification known as **understanding.**

Here is my personal problem with "blackboard scribbles:" their complexity is so negligible, so "on the edge of being nothing," so "at the very limit of meaning," that any opinion cannot be either supported or refuted. Anything goes. This is n*existence*: something, almost nothing, but with real emotional and monetary effects. The best embodiment of nexistence in art, its true hyper-realistic portrait, is the blank white canvas. To sell such picture today for $4.3 million you need to make six vertical knife slashes on it, as Lucio Fontana (1899-1968) did long ago in his *Concetto Spaziale*, *Attese* (*Spatial Concept, Waiting;* 1967). The slashes of Fontana or burns of Kasper Sonne look like a further way to decrease existence and flip it to negative values.



A **B**

A: Lucio Fontana, *Concetto Spaziale, Attese* ; B: Kasper Sonne, *Borderline (new territory) No. 11* (1912).

The route from the object to its description in artspeak is strictly one-way. It is impossible to imagine and reconstruct the object from its artspeak representation. This applies to minimalism in general and most of modern art. The viewer is completely free to feel anything. There is nothing to simplify (= understand). At least, there is something to celebrate: freedom. Do I need to repeat my mantra "Art is what…" etc.?

"On the edge of being nothing" is an excellent expression for what I call nexistence. It also applies to the category of **future**, which is where nexistence reins uncontested. Future is always on the edge of being nothing and turning to the presence. The past, however, is never *nothing* for as long as it is remembered, even if the memory is false.

Art, like most of human matters, is based on belief, but even science starts with a belief (hypothesis) or disbelief (discovery). The difference of classical art from modern one is that belief in the former is supported by the context, visual and informative, as well as human experience, knowledge, and memory.



Figure 9.4. Fact and belief. Left to right: Rembrandt: *Prodigal Son; Head of Christ*; Picasso, *Guitariste* (1910-11); Mondrian, *Flowering Trees* (1912); project sketch of Y-Block, Oslo (fragment).

The context in Rembrandt's *Return of the Prodigal Son* (**Figure 9.4**) is obvious for anybody familiar with the Gospel of Luke, but his *Head of Christ* (one of several sketches of the same model) asks for less literal beliefs, unless both pictures are regarded simply as illustrations to a text. For some of Rembrandt's contemporaries, his heads of Christ were offensively modernist. There is nothing obvious in them to associate with Christ, as there is nothing to associate the painting *Guitariste* (Picasso, 1910-1911) with either a woman or any musical instrument, unless we believe the title, the commentaries, or exert our imagination. Piet Mondrian's *Flowering Trees* can be called, anachronistically, *Y-block, Oslo.* Cy Twombly used to turn our blindfolded imagination in the right direction with a dollop of **existence** in the form of scribbles on his paintings.

Everything in religious or ideological belief is belief. The behavior, which is the only possible evidence of a belief, could be opportunism, conformism, delusion, transient mood, or conscious deceit. In an authoritarian society, it could be sufficient to declare publicly the required statement of faith to be left in peace. In a totalitarian society, however, like it was in the Communist Russia, Mao's China, and is in the Korea of the Kims, one had to confirm it by daily behavior and participation in rituals.

Consensus over perception could be shaky, but it is possible. If nine randomly selected people say that this is a red dot circle (spot, disk, circle) → ●, it exists, even if the tenth witness disagrees. The presence of the red dot on this page can be proved beyond the shadow of a doubt. This is true about the dot, but may not be true about a "guilty" verdict, medical diagnosis, scientific hypothesis, and any majority vote on arts and human matters in general.

Everything in human matters is debatable. The tenth witness could be right and the nine others wrong. What was right yesterday could be right today. What is right today may horrify you tomorrow. Religious fundamentalists can split hair on what was consensual for millennia: who is alive, who is born, and who is dead. Belief is a ticket with its admission stub torn off.



If a young modern artist relies on "Practice!" to get to the Carnegie Hall of art, it is better be practice in overturning the bus.

After 85 pages of this Essay, can I say some fundamental truth that would be not just my own belief but something at least pretending to be provable or at least reasonably hypothetical?

Alas, I cannot. I can see in art nothing but myself. Art is a mirror.

10. ART AS MIRROR

I see a painting. It is a thing made of wood, canvas, and paint. I can describe it as a picture of a young woman with long hair in a strange big hat (**Figure 10.1B**) because whatever it is, I can list all its recognizable components, even if they are small dots and flecks. My description will not be enough to reconstruct the picture, least of all from the "young woman in a hat" title alone. The short description "six rows of dense white spiral squiggles on black background, 68 x 90 in″ (**Figure 10.1C**) is a more informative and better reproducible one. There is a chance that a reconstruction will be close to the original.

The "squiggles" of Leonardo da Vinci[101] (to whom Cy Twombly's was once compared in ecstatic artspeak) show the entire distance between Renaissance and Art Reformation (**Figure 10A**). I measure the distance neither in centuries nor in content, but in complexity.



A B C

Figure 10.1. Art space and art time.

A: Leonardo da Vinci, Drawing of a flood (c.1500) ; B:František Šimon (1877-1942), *Young Woman in a Hat*, *ca.* 1900; C: Cy Twombly, Untitled (New York City), 1968. 68x90″ (172.7 x 228.6 cm). Sale: $70.5 million in 2015. Catalogue note. Video.

Barnett Newman's paintings are so simple that they can be probably reconstructed (*forged* is a better term) from measurements of geometry, color, and the well-known technique of his *zip*.

[101] In his later years, Leonardo da Vinci was preoccupied with water, flood, forces of destruction, and the end of the world. See also his *A Deluge*. We are in his steps today.

In visual arts, everything is *concrete* in the sense of the perceptual, especially "abstraction," and nothing is *abstract* in the sense of the conceptual, except the frills of the artspeak wrapping. "Abstraction" in art means, paradoxically, something so **concrete** that it can be described well enough for credible reconstruction, materialization, and multiplying in many variations. It is a dish with a simple recipe, like French toast. This comparison means that (1) it uses a technology and (2) it can be enjoyed or disliked. In addition to artistic techniques, modern art appropriated the main contribution of its native century: technology.

The objective properties of art, whether simple or complex, connect all art into a single **art space** in which there are pathways of transformation, short or long, from any "recipe" (more respectfully, individual style) to any other. Thus, in the art of cooking, if you have a recipe of Italian Wedding Soup, you can turn it into the recipe of Lasagna by changing the ingredients, sequence of stages, and parameters. We can do it one change at a time, so that each step of transformation will be between close neighbors. Naturally, many intermediate dishes between soup and lasagna can be inedible because some ingredients do not go together, but maybe we should still try them before rejection. Meals, therefore, make an abstract space in which you can travel from one point to another.

As for squiggles, we can move by a series of changes from Leonardo da Vinci to Cy Twombly and, unbelievably, back, which by no means justifies taking any rapturous catalogue notes literally.

> In my culinary analogy I use the idea of the book *How to Bake a Pi : An Edible Exploration of Mathematics* by Eugenia Cheng (Basic Books, 2015). It is about category theory, a branch of mathematic so abstract that some mathematicians consider it mathematically inedible. It is a matter of individual taste, of course. Category theory is not described in the book, however, only what can you do with it. It is an invitation to the party of abstract mathematics without letting you in.

Pattern Theory of Ulf Grenander, which is my personal obsession and foundation of spirospero.net, has a high level of abstraction. Nevertheless, it is applicable to anything concrete, including human matters, individual and global, for which hard science loses its edge. Pattern Theory is a kind of a mathematical chemistry (if not physics) of Everything and its transformations. Its secret is an element of personal "taste" (selection of generators and a template) together with quantitative measure (probability or energy).

Creation is a process, and time means physics. Chemistry is physics of molecules, i.e., **individual structures**, each being the only one in the world[102], and their change into each other. Should I say *creatures* instead of *structures*? Close enough. *Creations*? That's exactly my point, but I have yet a counterpoint to make.

An artwork, for example, any of the three pictures in **Figure 10.1** (I will come back to the woman in a hat later), belongs not only to the art space open to all, but also to a different parallel

[102] While chemical structures are individual, molecules of the same structure are multiple like clones. Structure is abstraction (property, idea), and this is why two equal structures is just one, while there could be millions of equal screws and other Things.

universe: the **perception** of art by any individual in the public, of which I **am the only one** I can observe in full, inside out.

My impression of any artwork consists not only of what I see, but also of what I feel and think in front of it as well as between our meetings face to face. This is what I mean by art as mirror that shows me only myself. "Mirror" is just a metaphor and it should not be taken too seriously, or we would drown in philosophy of subject-object relation.

What I want to say is that my perception of the painting is as unique as the painting itself. In a sense, the painting and I are of the same blood of uniqueness, which does not prevent us from various similarities with other humans and paintings. We, individuals, also inhabit a space where we are split into species, families, orders, etc., quite like plants and animals; so do artworks and artists (ART AS TREE).

The perceptions by other people are unknown simply because we cannot read other people's **minds.** Someday, a successor of Apple or Google or Amazon will develop a system to crack human mind—we are already skilled in manipulating it—but I, retrograde as I am, hate to think about the future in which the difference between humans and robots disappears. But I am ahead of ART AS FUTURE. Instead, I am going to my own **past** stored in the vaults of my own mind.

Next, I am coming to my first electrical contact with modern, by mid-20th century standards, art of painting: Josef Sima.

It was in late 1960's, in a dark, bleak, brutally polluted Siberian city with empty shelves in the stores. May I still allow myself a little *myspeak,* a cousin of artspeak? Thanks.

Siberia had scarce indigenous population. It was colonized by Russia in the 16th century and developed by generations of former escaped serfs, prisoners, exiles of Russian czars and Stalin, and WW2 refugees who did not return home. Surrounded by hills, the city of Krasnoyarsk[103] straddles the powerful majestic Yenissei River with its perpetual nervous shivers along the spine, as if foreboding the Arctic Ocean, its final destination.

Living alone between two marriages and a few impenetrable to nails concrete walls of a small standard Soviet apartment, I was a frequent visitor of the old and rich local library. Scores of pre-Soviet Russian books in its "special" storage were forbidden to give to common Russian public. Young librarians secretly supplied me with famous, quoted, referred to, but unreachable books, which I needed in my search for the Czarist roots of the Soviet empire. The roots have survived to this day and the current tree of Putinism has grown high and wide on them**.**

> Who could imagine in the pre-1914 word that the empire of the czars would fall soon? A few could imagine in the post-1945 world that the Nuclear Empire of the Communists would rise. Even less could foresee its fall by the end of the millennium. But that was already the time to foresee the current

[103] Krasnoyarsk, founded in 1628, a center of a giant region, has been by now transformed, beautified, packed with universities, theaters, and concert halls, and grown to 1 million residents. It is still the third most air-polluted city in Russia.

restauration of the Czarism by Putin. This experience makes me worried about the future of America. History is not just about the past. It is about the **unthinkable** future.

As for my personal history, I was about to meet my future wife in the library—a future that somehow has escaped turning into past.

By that time, already deeply immersed in classical music, I discovered the music of the 20th century. Dmitry Shostakovich was aggravating my depression with his bubbles of optimism in the dark brew, while Bela Bartok was hitting me out of anguish by his bitter dissonances, skepticism, and refusal to surrender to both barbarity and beauty. Buying all vinyl LP records I could find, I ran into a Czechoslovak record, I do not remember which, with a reproduction of a painting on the jacket. It was *The Return of Theseus* by Josef Sima (Šíma; sounds Shima).



Josef Šíma (1891-1971), *Návrat Theseův*, (Return of Theseus), 1933. Source.

Theseus, a mythical Greek hero, had promised his father Aegeus to put up white sails as sign of his victory over Minotaur, but he had forgotten his promise and left the black sails on the mast. His grieving father committed suicide, plunging in the sea of his name.

I had glued the picture to the nail-resistant wall and it became a part of my personal mythology. It was unlike any artwork I had seen before and it was stirring some very vague forebodings in my soul under Cold War tension, totalitarian idiocy, and the recent (1968) Russian invasion of Czechoslovakia .

Here in America, I often searched for Josef Sima on the Web in vain until our happy reunion about ten years ago. Recently, I have cast a net into the Net again and found much more materials about the artist. It turned out that Sima was still alive when his Theseus and I had met each other for the first time. As for the picture, it is on my American cardboard-plaster wall again.

At the first glance, I had been struck by the clouds in the sky. Hovering over the grassy sea, they were unmistakably made of stone.

It is hard to say whether the sail is really black or just looks so in the dense shadow of a cloud. Sima is often presented as surrealist, but I see him as a symbolist—the style which, like surrealism, is unthinkable without content. I saw the picture as a metaphor, here a visual one, which is the essence of poetry. I thought the *Return* was about the future caught in the moment of its catastrophic turning into the past. Cornelia Parker's squashed and silenced but still

glimmering brass instruments, stopped in their fall on the floor, like Sima's clouds, flicker in my prone to associations mind.

Now, in 2015, numerous works of Josef Sima are scattered all over the Web (example), with comments in English, Spanish, French, and, of course, Czech . **Figure 10.2** shows some of his other works, but I am more than ever certain that the *Return* is unique.

Wandering over any new domain of reality, we accumulate a stock of distinctions between local goods and habits. We begin to judge it not by differences from other domains, but by internal standards and practices. We lose most of the reasons for hostility and outright rejection. This happened to me when I started this Essay. In a modern art gallery, you can pat Minotaur all day long. Wading under the dripping stone clouds through the littered grassy seas of modern art, I lost my initial prejudice against its aggressive, provocative, deceitful, vulgar, and exploiting denizens and found there something to feel at home and to be comforted with, for a while, before returning home.

Modern art without any human or other living presence on the canvas leaves me mostly indifferent. Symbolism and surrealism are my most comfortable artistic movements. Like poetry, which uses human language in the way we never speak in everyday life, surrealism paints the world that we never see around but still easily recognize, like the headless but still human torso in **Figure 10.2.1**.



Figure 10.2. Selected works of Josef Šíma.

1. Untitled; 2. Scenery; 3. Portrait of a Dancer; 4. A Whore of Barcelona (1940); 5. Europa (1927); 6. Composition; 7. **Return of Odysseus, (1943); 8. Untitled; 9. Sea (1960) 10. Untitled (1967). Sources: 1, 6, 9:** A**; 2:** B**; 3:** C **; 4:** D**; 5:** E**; 7:** F**; 8:** G**; 10:** K**. Credit for 3 and 10:** Ras Marley **(a treasure of a site).**

The minimalist Soviet reality was as boring as a straight line. The curved with passions human body of it was not. Human nature is the most stable and conservative factor on Earth, more that our rivers, woods, and mountains, but it has the same inexhaustible variability.

Looking into the art mirror, I begin to understand why I dislike minimalism anywhere in arts, except literature. In my youth, I was obsessed with Ernest Hemingway. I love understatement and everything that stimulates my mind with incompleteness. I enjoy surprise, novelty, unpredictability, probably, because in my insulated Soviet childhood in a small apartment of a bleak provincial Ukrainian city (much brighter, it seems, now) it could be found only in books, music, and movies. Another reason could be the respect for human labor and contempt for laziness, both deeply implanted into my childhood values.

Art as mirror means that the live perception of an artwork is an encrypted—subconscious—look at yourself, your own space of childhood, school, upbringing, family, youth, love affairs, politics, and the rest of life, up to the current weather, a recent phone call, and latest troubling headlines. The perception can turn around in an instant, lose the charm halo, or, on the contrary, envelop itself in sweet haze. Recently, having finished a small brilliant book (Jenny Offill's *Dept. of Speculation*), I was so excited by human talent that I would probably be able to praise Damien Hirst's polka dots in artspeak. If you love something, you love everything around.

There are reasons for everything. Why is Rembrandt holding a special place among classical painters for me? Even before I saw my first Rembrandt at the Pushkin Museum in Moscow, I had heard, as a child, a radio play (it was the pre-TV era) about his life. It deeply moved me. The sorrowful sigh "O, Rembrandt, Rembrandt!" still sounds in my ears. I am looking at the *Return of Theseus* 45 years after the first impact and I feel the hot waves of memory.

How do I feel them? This question opens for me the third space of art: **physiology**.

It is well known and described as goosebumps, shivers down the spine, and even "musical orgasm" (Google it). I feel it as a sudden hot wave in my chest and a constriction in my throat. In visual arts, only Velazquez and Rembrandt used to give me that peculiar sensation, if I was in the mood, but with my Odyssey through modern art, it happens more often. In science, it is the moment of invention, discovery, understanding, and solving a difficult problem. It has a tinge of recognition and something of reliving a dramatic past event, like passionate love, shameful failure, painful loss, or escaping a terrible disaster.

I formulate it as a combination of the seemingly incompatible **recognition** and **surprise.** This is what I am looking for in literature, poetry, music, and movies.

> "We feel nostalgia for a place simply because we've lived there; whether we lived well or badly scarcely matters." (Michel Houellebecq, *Submission*, Farrar, Straus and Giroux, 2015, p. 217).

My image of this sensation is the sudden fizzling of carbonated water, quiet in bottle but effervescent when poured into a glass. I also find it similar to a mild electric shock. It does not come automatically as response to the same pieces of art, but depends on the environment, mood of the moment, the overall level of wellbeing (preferably, low), and preceding or pending events. I certainly reject the terms like "awesome feelings," "ineffable essence of existence," or "state of being."

Here is a fresh example. I was looking on Google for Josef Sima. At the Flickr site of Ras Marley, full of rare art, I ran into a picture of a woman in a strange hat and felt the familiar shivers down my spine. It was *Young Woman in a Hat* of Simon Frantisek (1877-1942), an interesting artist and compatriot of Josef Sima. I had never heard about him before.



Figure 10.3. Recognition and surprise. A rat in the hat.

I see no clear reason why I was *electrified* by this picture. I have a weak guess, however. It was a **familiar** generic profile of a young woman in a **surprising** hat that made her look like a rat (**Figure 10.3**).

My favorite poet is Reiner Maria Rilke (1875-1926). The poets I love, including Rilke, sound like nothing one can hear in the street, in a company, or, actually, anywhere. Logically, genuine poetry, quite like modern art, does not make much sense, unless you are tuned up to it. You have to believe in it or just love instinctively or because you see something of yourself in it. Poets are not mad, however. They just do not want to say plainly what they feel, like abstract artists who do not want to paint plainly what they see (this is yet another reason why it is wrong to see this Essay as an attack on modern art).

> "…I essentially am not in madness, But mad in craft." (*Hamlet*, III. iv. 187-8.).

I used to read poetry, waiting for my uncontrollable response with **extremely rare** physical sensations and emotions. I expect the same from music, cinema, and other arts. I got the same feeling right after having solved a difficult scientific or technical problem. It is the rarity of this feeling that makes it so treasured.

The mirror of art is hazy and buckled, but at least it can be trusted: it cannot **show** what does not exist. It does not show a big world where the eye can be lost: it shows the viewer, as mirrors do. What do I see there about myself?



Artwork exists in several real dimensions: materials, size, age, amount of artistic labor, price. Labor, originality, imagination, complexity, and intensity cannot be quantified, but they can be loosely compared for any two works side by side. There are also countless transcendent dimensions, like sublimity, simplicity, intimacy, intensity, emotiveness, ambivalence, efflorescence, nobility, brutality, etc. They are expressed in artspeak, which is the inflated language of lot essays and comments at auctions, reviews, and art books. Together they cover the issues of meaning (ostensibly) and price range (furtively). There is also content: a formal dispassionate description of the image as seen by disinterested people. Most viewers can agree, for example, on "this is a stylized drawing of a horse," or "that is a series of alternating 6 horizontal pale pink and 7 pale blue stripes" (Agnes Martin, *Happy Holiday*, 1999) or "a high relief of a winged human-bull chimera." The content can be referred to outside sources, as in classical paintings on biblical themes.

Meaning is the cloud where nexistence rests. It is a guess of artist's intent, personal impression of an art reporter, interpretation of the symbolism of the flowers in a vase, and so on. In modern times, artist's own narrative of intent at an interview is explicit but impossible to verify. The meaning can be a mix of reason, emotion, and distraction.

> While I am writing these lines, there is a small group of picketers protesting display of August Renoir's paintings in Boston Museum of Fine Arts. The reason: Renoir was a bad painter. "Renoir sucks."





Modern art as a whole is a kind of performance art in which an immediate instinctive reaction of public is expected and manipulated. Art is the wind in the neighborhood, to which different chimes respond with different sounds of the same timbre.

Do we love or hate a particular person, artwork, company, gadget, or in fact some principle that the objects represent, or, even deeper, some pattern, event, awkward situation of our past related to the principle? To reach the heart of the matter, do we love or hate something in ourselves? Do we love something because it flatters us or strums our pleasure strings? Nexistence does not exist, but some of us see and praise it and, maybe, even believe in it. What can they see in it but themselves?

A confessed narrow-minded minimalism-hater, I could not understand how anybody can like and praise the scribbles of Cy Twombly when I first discovered them. In my heart, I still do not, but I see in them my regrettable intolerance to something that has no relation whatsoever to myself. Still, paeans to Barnett Newman make me feel fretful and uncomfortable. What do his paintings tell me about myself that I did not know? I am diving into my memory (and Google) and… warmer… deeper… I am 18 years old… and here is what I am finding, to my surprise.

A year of weekly class of formal logic was part of my high school curriculum. We had a wonderful flamboyant and utterly non-Soviet-looking teacher of logic and psychology, who, unfortunately, often missed his classes. In my life, he was the first ever person who emanated active spontaneous intelligence—something impossible to see in Soviet life. Moreover, Semyon Moiseevich Vul was the only living example of what was called in books poetic appearance. After almost 60 years, I am still feeling his imprint: my interest in logical **abstraction** (!), which underlines my skepticism regarding artistic **abstraction**. After long search, I have recently found some details of his biography and creativity, together with a much later photo. Two more teachers imprinted me with interest in abstract mathematics and history, and I remember them gratefully.



Semyon Vul (1970?)

Logic was difficult for everybody, but I was fascinated by its abstractness, power, and rigor. One of the four laws of logic, according to our textbook, was the law of sufficient reason: everything must have a cause. This law, I now believe, had shaped my attitude to doctrines for the rest of my life: I do not easily trust anything I am told—outside poetry—without rational explanation. That was also a reason why I began to doubt the doctrine of Soviet Communism: it was not only self-contradicting but also lacking sufficient reasons, a dogma to believe and, actually, the very first religion I knew. Buddhism was next. Christianity and, much later, Judaism followed.

Only while working on this Essay I learned that the law of sufficient reason was not a law of logic. It was a not universally recognized principle of philosophy associated with the name of Leibniz, although practiced already by Plato. Anyway, it was too late to reform a fervent rationalist, distrustful of dictates, imperatives, beliefs, and self-evident principles, but it taught me to look for the reasons of each of two irreconcilable positions even if both, as in politics, lacked sufficient reason.

Here are two samples of superb artspeak in which I emphasize, in bold print, a contradiction, as I see it.

(1) Dr. Roann Barris, Radford University, in Barnett Newman and the Sublime: The Terror of the Unknowable .

> If we can reduce Newman's goals to only three, they would be a call for an art which would embody **the essence of myth,** embody the sublime, and an art which would be the pure idea. This last belief is central to Newman's goals: that a shape is alive and contains the awesome feelings which a person has in front of **the terror of the unknowable,** or the sublime. But sublime terror is not the same as horror: horror is what you feel in the aftermath of tragedy, when it is too late to do anything. Terror is what you feel in the face of the sublime: humans can overcome terror through acts of creation and this is the value of art. Yet, this act of creation implies an act of starting over, and for Newman, this is the fundamental issue facing the twentieth century artist: the search for what to paint without making any references to previous artistic tradition.

(2) Sothebys Auction Lot Note, May 2013 (Anonymous phone bidder paid $43,845,000 for the painting) :

> Along with other heroic artists of the Twentieth Century, Newman wanted to regenerate art and society through the invention of new forms of expression that could capture the **ineffable essence of existence.** *Onement VI* and its fellow paintings are not representational – they convey a **state of being and communion**.
>
> In *Onement VI*, the single zip resonates within the canvas and with the viewer; it is described both by sharp tactile edges that retain a crisp memory of the delineating tape and by the gentle laps of marine blue that seep into the void of the cool light blue. Soft ghostly traces toward the bottom of the zip disperse as if into air, while deeper bleeds at eye level seek to bridge the gap of the zip from edge to edge, creating a spatial tension. The act of the pigment bleed is the locus of the temporal element in Newman's work that finds corresponding resonance with the temporal experience of viewing *Onement VI* at our **leisure and contemplatively**.

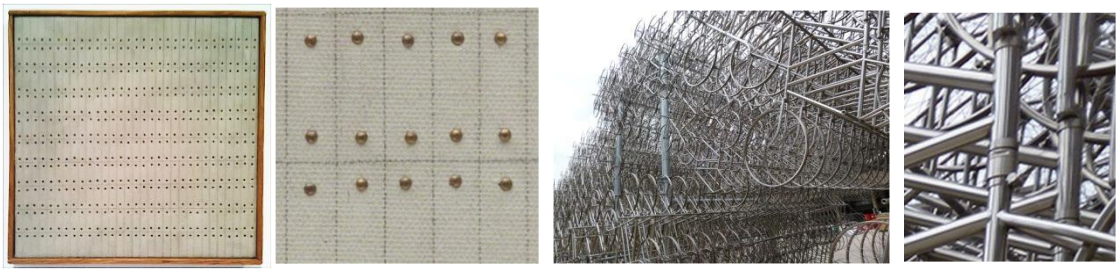
I do not see any sufficient reason for any of both statements basing on the appearance and history of *Onement VI*, but I see **a reason** for the dissonant duo. Art is nexistence and this is why you can say anything about it. It is you who exists and has some personal reason or subconscious urge to make a statement.

Of course, we cannot judge the auction lot notes by the same standards as academic research. The notes are utilitarian poetry and advertisement, as befits this particular genre.

Back to logic, it turns out, after having consulted Wikipedia, that the law of sufficient reason is not a law but a principle, and not of logic, but of philosophy, and it is controversial (as everything in philosophy, which I learned to like as a branch of dreary but imaginative poetry). Imprinted by rationalism, I had settled in science and remained, like an amphibian, at home in arts.

To criticize poetry and arts in general on rational terms is hopeless. Art is never objectively good or bad. If *Onement VI* was sold for $43,845,000, however, there must be a reason for that, rational or not, but definitely simple and clear in advance.

Market is as hard on artists as professional boxing and football on sportsmen. It wears artists down. Success, like gluttony, deposits plaque in their creative arteries. Self-imitation (not to mix up with variations) reminds me of a revolutionary liberator gradually turning into a tyrant.



1 2 3 4

Figure 10.4. Monotony. Fatigue. Self-replication.
1, 2. Agnes Martin, *Untitled*, 1962 (with brass nails) ; 3, 4. Ai Weiwei, *Forever Bicycles*, Toronto, 2013 (not real bicycles). Photos (Flickr): 1. Sam Beebe**, 3.** Cameron Norman

Self-imitation becomes self-multiplication, quite like the division of bacteria.

Figure 10.4 shows examples of what I do not like in arts: the bacterial self-propagation—the essence of boredom and the symptom of fatigue. At the same time, it reflects how I, imprinted in my schoolyears with formal logic, see the world as a pyramid built from single facts (terms) to more and more abstract ideas. It is also the vision materialized in information technology. This is why I see relations between objects, events, and phenomena that have nothing in common for most normal people. The grids, stripes, and nails of Agnes Martin,[104] 600 stools, 3144 imitations of bicycles, 100,000,000 (150 tons) of porcelain sunflower seeds, and 38 tons of steel reinforcing bars of Ai Weiwei—all that, from the point of view of my personal esthetics, is just one **pattern** of artistic monotony, if not a mania.

Self-multiplication is different from the respectable in music but rare in poetry genre of variations on a theme.

A cycle of variations on the theme of "line" could include power lines, clotheslines, genealogical lineage, and human lineups, branching into food lines, lines of POWs to be executed, children getting into a school bus, etc. Variations change the subject but preserve an abstract pattern,

[104] Agnes Martin's *Untitled* (1962) with nails belongs to San Diego Museum of Contemporary Art. The almost identical *Little Sister* (1962) is in Guggenheim Museum, New York.

sometimes to hardly recognizable similarity. Artistic style is in most cases a theme with variations. A great artist (composer, writer, poet, performer) is the one who is able to change the **theme**, not just the style of variation. Examples: Beethoven, Tolstoy, Picasso, Rilke.

If art is a mirror, what else do I see in it? It is not the pile of gravel, paper boulders, and hovering stones that attract me. It is the **invisible** human presence of the authors. It is the creators: inventive and stubborn human beings who stand out against the crowd of cross-imitators. For me the presence of life in any form is a condition of artistry, from an uninhabited landscape to human body and all life forms between the two.

With years, my interest in all arts, including movies and literature, has shifted to **how** it is made. I highly grade creativity, complexity of means, uniqueness, audacity, and the mix of surprise and recognition. In other words, I value performance more than content, somewhat contradicting myself, but I set my own bloodthirsty standards for performance.

Now I am rather indifferent to "what" but hypersensitive to "how." The "how" tells me about the artist, which is incomparably more interesting for me in modern art than what I see in an artwork, even in movies. I am a seeker of human warmth and sparkle. Is there a sufficient reason? Because it is rare.

The low stony clouds almost cutting the water—it is about me because I give in to the illusion that the artist at some moment of his life felt like me. In 1933, in the shadow of Germany, it could be very much so.

I cannot argue with the mirror. One could conclude from my relation to visual arts that I am extremely self-focused. Should I accept it? I have already done that in this paragraph.

For comparison, here are my relations with other arts.

In spite of my wide range of interests, my tastes are very narrow. Oh my God! It turns out that I am a minimalist, too. There are waste spaces of popular entertainment that I completely ignore. My music preferences run from Bela Bartok to Portuguese *fados* and Latino *alegria*, from Franz Schubert to American Blues, and from Sviatoslav Richter and Sarah Chang to Bulgarian folk chorus, but the distance between the landmarks is very sparsely inhabited. Same with literature: my three last reading feasts were John Edward Williams, Michel Houellebecq, and Marcel Proust; the latter was a long and often exhausting climb to an unforgettable view from the top. Sometimes, I take a praised book, start reading, see the author behind it, feel the thin "how," weigh on my hand 400 to 500 pages of "what" (the side effect of writing with computer) and return it to the library after few chapters.

I am deaf to early classical music, baroque, and, with few strong exceptions, most (but not all!!!) of Bach and Mozart, the common musical diet for people of my age. Although repelled by minimalism in art, I chase simplicity and scout simple reasons in human matters, tangled but as simple as a jumbled packing string when straighten. Art, the realm of *what* and not *why*, is not for understanding but for tension and thrill, but I get my strongest kick from *how*.

I dislike anything aggressive and vulgar, as well as predictable, controlled, and mellifluous. I love novelty, even if gritty, but appreciation of novelty can only develop from wide knowledge, which I do not have in visual arts. Fortunately, the Web is a giant, comprehensive, and always open art gallery. Flickr, Instagram, and Pinterest have splendid collections of less known artists. They are coral reefs full of beauty and mystery, not a tank with a rotting shark.

After my first accidental but fateful encounters with modern art, I began to web-educate myself further, which turned out an exciting but finite endeavor. Modern art is an orgy of effervescence, exuberance, and extravagance—complemented by their corresponding opposites. It is also an ebullient local and affordable marketplace. There are young and old obscure artists who could be reflected behind our backs in the mirror of art before they are captured by headlines and lead to the marketplace in chains made of zeros and clasped with a dollar sign.

This chapter has been a mess. When somebody is analyzing himself, with mirror or not, it is always a mess. I came to the art marketplace not for art, not for my reflection in it, however, but for the message of art about the future of all of us, except myself. I am taking nexistence by the horns.

11. ART AS FUTURE

The future has been the most powerful stimulus for the evolution of human imagination, intelligence, and language. Indeed, everybody can see the present, and if not, it can be pointed to with a gesture or a warning cry. The present is so ephemeral, however, that it turns into past right before one's eyes and loses all its relevance, unless we immediately extrapolate it into the future. We remember and store the past because we need it in the future. But the future, although crucially important for survival, does not exist! How can you discuss it, paint its alternative pictures in the mind, and share it with another mind if you do not keep it in the present by **thinking** about it day and night? I begin to consider the cave pictures as being about the tomorrow's hunt, not the yesterday's one. They were attempts to see nexistence and, probably, retain it in spite of a scarce vocabulary.

With our modern sumptuous vocabulary, it is practically impossible to talk about the epitome of nexistence without falling into some kind of *futurespeak*, similar to artspeak. If I veer off the well-tempered soundtrack, I apologize in advance for my shrieks and moans.

In my search for a magic mirror showing not myself but the future, in which I have no stake at my age, I recall the Reflecting Pool, the uncommon spacious landmark of Boston, **Figure 11.1.**

The photos in the **Figure 11.1** illustrate my vision of modern art as a fenced-off, passive, and enigmatic zone of our civilization. Like water and sunflower seeds, art can fill any shape. It reflects the surroundings. As a small part of economy, it must have the properties of the whole. The active role of visual art in society is minimal, but in advertisement, design, and decoration—and as status symbol—it is by no means art for art's sake. It is because of its detachment that I believe in the prophetic ability of art. Art reflects, foresees, and prophesizes, not intentionally but in a kind of somnambular or drug-induced trance to which, however, hardly anybody pays attention.



Part of <u>Janice Kerbel's series</u> permuting the same words (2014).

Unlike the oracle of Delphi, visual art is silent (maybe, not for long). It addresses our most informative sense of vision and its Pythias speak in puzzling tongs of sign language. Text and speech can be misunderstood, but art has no verbal ← mediator even if it is just word art on paper.

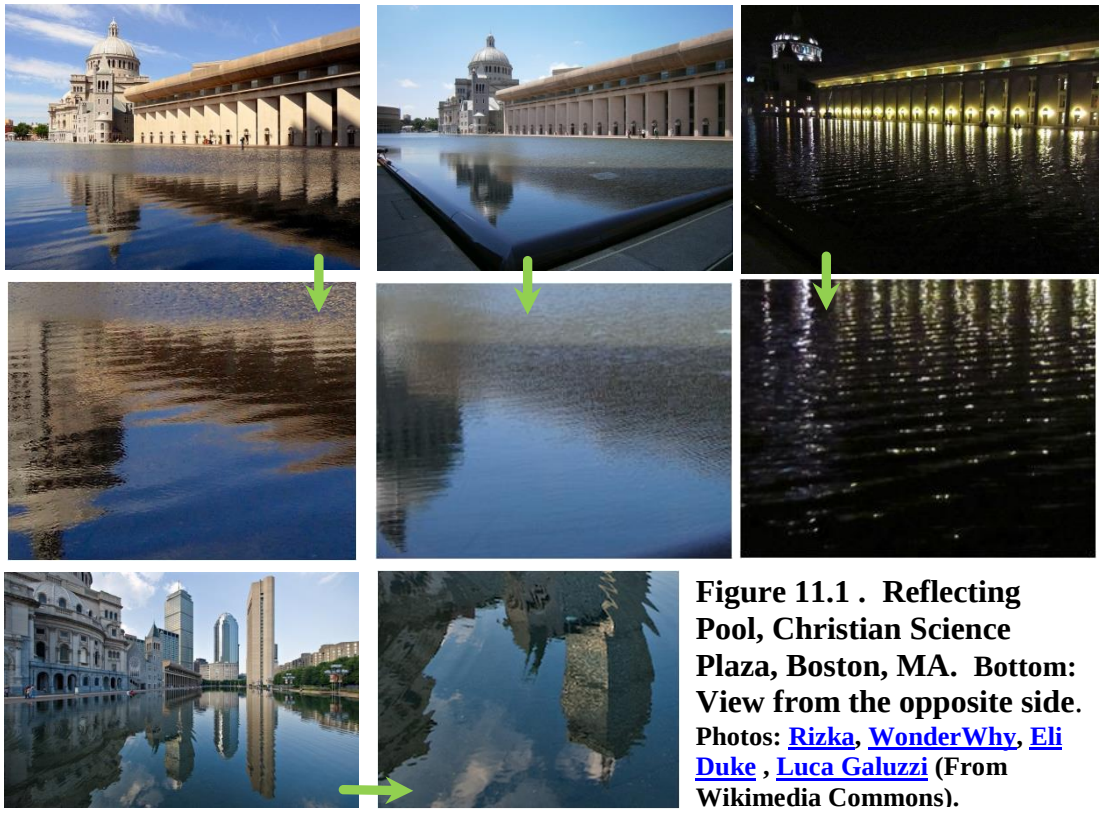


Figure 11.1 . Reflecting Pool, Christian Science Plaza, Boston, MA. Bottom: View from the opposite side. **Photos: Rizka, WonderWhy, Eli Duke , Luca Galuzzi (From Wikimedia Commons).**

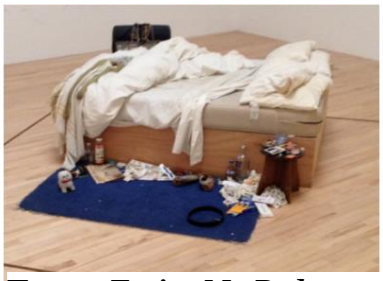
Art can be explored as an emergent or recurrent pattern, the same way the satellite photos of the Earth can be trusted as prophesy of climate change. That can be said about any other facet of our civilization, but the advantage of art is twofold: it is available for observation in its entirety not only in physical space, but also in time, i.e., as preserved history. Even bygone biological species do not have such full continuity of their observable past as pictures and sculptures. Art has been systematically dated, signed, collected, stored, and sometimes deliberately destroyed. Art has nothing to hide and requires nothing arcane to learn. Just do not ask too many questions. You will be told more than you ask for, anyway.

History is potentially the closest approximation of science in humanities —something no scientist will believe but historians are struggling to prove.

As for modern art, we are reminded at each our step through the galleries that there is nothing to understand and everything to experience, as if watching a cake in a glass showcase is experience.

Like the Reflecting Pool—or a bed in a room—art is traditionally elevated above the ground level of daily routine and toil. The Pool shows an upside down image of its quiet ambiance. The capricious and wobbly wind-driven picture on the water depends on your place and time of viewing. On a quiet day, it shows two complexes of worship: one of money, piercing the skies, and the other of faith, kneeling on the ground. You can see one or the other from the two opposite ends of the Pool, which is, in a way, how it works in life, but there is a kinship of belief between both.

Art proudly and defiantly guards its independence, but in our times, all borders, interfaces, and defenses are getting more and more permeable. Even the national borders are mostly symbolic. Art, too, is connected with outer world in numerous ways, some invisible and others, like with money, conspicuous. The very difference between reality and fiction in digital era is vanishing because we are looking at the world through somebody else's cameras feeding the pages of somebody else's websites. Even the money, which in times of classical art could be rubbed between fingers, dropped to jingle on a beggar's plate, and probed by biting down, is immune to the physical conservation laws. It can be erased or created in an instance without your moving a finger—by somebody else's finger.



Tracey Emin, ***My Bed.***
Photo: Leo Reynolds **(cropped).**

Art is what cannot be expressed in plane words and logical discourse. All arts, even the movies, are articulated, played, and made in ways we do not speak, paint, draw, and act in everyday life. Art is supposed to be something as divided from the ordinary life as the sacred from the profane—for as long as this difference persists. *My Bed* by Tracey Emin, with its condoms and body fluids, forcefully violates the difference, but it is art because it was (1) exhibited **as art** (2) not in a bedroom but at Tate Gallery, and (3) was sold as art at Christie's in 2014 for $4,351,969.

The water in the Pool plays with the surrounding solid structures in thousands of ways, depending on the weather and hour. Art plays with life in the same way and often there is no similarity whatsoever between life and its reflection. There can be a reflection without life. Still, art directly addresses human senses, even when a computer squeezes in.[105]

Art is made of physical matter. It is organized as human activity and branch of economy. It occupies designated buildings, occasionally spilling into open spaces. It involves hundreds of thousands of people. This is why art submits to the truly universal dictate of any evolving complex system (*exystem;* see complexity or Introduction to Pattern Chemistry): consume energy, maximize its dissipation, grow, and evolve to stay alive among other competing exystems. Art is similar to economy, ideology, science, culture, education, institutions, organized crime, terrorism, ecosystems, and life on earth. But art is much smaller, simpler, and often as messy as *My Bed*. There could be something we do not see under the pillows and linen. Is it under the bed?[106]

I see the world as a laboratory of pattern chemistry.

> I am not going to expand here on what pattern chemistry is. All that, including the concept of exystem, which can emerge spontaneously in a minimalist fashion, but needs complexity to be

[105] "Much of the trouble in the visual arts today comes from our increasing dependence on the Internet, where all the richness and complexity of an artist's painterly surfaces is reduced to pixels." Jed Perl, *The Perils of Painting Now*, *NY Review of Books*, Sept. 24, 2015, p. 57.

[106] The famous economist and prophet Nouriel Roubini, himself an art collector, believes that there is a dark side of art market. There is. See: Sam Knight, *The Bouvier Affair*, *The New Yorker*, Feb. 8&15, 2016. Google: Bouvier + Rybolovlev.

> capable of evolution, can be found on my website www.spirospero.net. It comes from the mathematics of patterns developed by Ulf Grenander and generalization of main ideas of chemistry. Sorry for my repetitions.

In a nutshell, the main idea of pattern chemistry is that the daily configurations of the world are countless and they never repeat. The world is large. Its history is long. Its memory loses details with time. The abstract world of patterns, however, is small. It is countable, recordable, and searchable. A big novelty, which happens not every year and not even every century, can be noticed and entered in the roster. Patterns have a very long life. They can stubbornly repeat itself, of which the latest striking examples are Putin's Russia, brought, in various aspects, 80 to 1000 years back, and the Islamic State setting the calendar 1400 years back—both obsessed with self-proclaimed greatness. The red tide of anti-intellectualism in America makes me nostalgic for the times of Benjamin Franklin. Although, in spite of my age, I have never met him, let me count the description of his lightning rod from my school textbook as a story about my uncle.

Patterns are long lasting regularities of existence. They are abstract counterparts of the laws of physical nature in the lawless individuality-ridden and chaotic human matters. New patterns of human matters can be discovered like new phenomena and laws in science. At the highest level of abstraction, there are few very general patterns that bridge human matters with physics and chemistry.[107] It means that there are few basic choices for history to change, until something radically new, like the mass **displacement** of humans by robots, appears. The **displacement** of millions from Syria is a distant configuration of the **displacement** pattern so common in the earlier human history. I will add the **displacement** of horses by cars to the same pattern to emphasize the generality of patterns that rivals that of mathematical equations.

> I remember times when drivers could tinker with the engines of their cars. If I am not mistaken, the driverless car, along Elon Musk, already rides on the back of the manhorse (do not mix up with horseman) who is **discouraged** or **forbidden to touch the steering wheel**. This is not an absolute novelty, but a big pattern novelty it is. Modern art is also a historical novelty, but there must be its **pattern mates** in all spheres of life where people are driven by nexistence, religion and political ideology among them.
>
> Michel Houellebecq, a new obscenely audacious prophet of postmodernity, perfectly expressed, by chance, the concept of pattern chemistry in his "*Elementary Particles*" when he remarked that humans usually "have a small number of choices, of which an even smaller number is taken." Obviously, it is easier to find the way in a small system than in a confusingly large one. Big data are intended only for computers with their own agenda, quirks, and giant heat-spewing servers banished out of sight to the cold latitudes where the Frankenstein's creation is still wandering over the remnants of the melting Arctic ice, jumping from ice floe to floe, scaring emaciated polar bears. I begin to master Proustspeak.

Art, as I have emphasized more than once, has the advantage of being seen directly in its entirety, as naked as Manet's *Olympia*, without rationalization and without a professional broker. Unlike the wonders of information, art is as material as a bone of a dinosaur or Tracey Emin's *My Bed*. There is nothing hidden, nothing to be ashamed of, and nothing to threaten us. It has

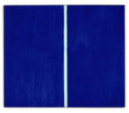
[107] A lot of related material has been accumulated by "Human Thermodynamics." See also.

no complicated theories behind. It is made to be seen, looked underneath, and (furtively) touched. It can be enjoyed (ha ha) if you are in the right mood, or hated (yuck) if you start picking on and asking questions. Whatever is said about modern art is equally true or false and is not provable or testable anyway.



A pattern historian, therefore, will look for the future in the rolodex of the past.

Patterns cannot illuminate the full length of either past or future. They are not a source of too much historical optimism, but the life of a generation is, in human terms, long enough to quietly accept the idea of historical mortality. "Evolution" sounds not as depressing as death in wars, revolutions, and riots. It sounds cheerful if we call it *progress*, with no real reason.



Here is what I see behind the curtain of Barnett Newman's *Onement VI*.

The main novelty I notice in the panorama of modern art is its topology.

Modern art uses an unlimited combinatory palette to select and mix in any possible way not only colors but forms, objects, things, symbols, materials, chemicals, organisms, body excretions, ideas, words, life, death, nature, history, trivia, and, o yes, nothing—all that without constraints of meaning. I am saying "without constraints," but there must be some.

The search for constraints and regularities in arts is a subject of *formalism*. It is a branch of *structuralism*, one of the not too old precursors of Pattern Theory. Structure itself is a topological idea. Formalism studies a work of art, literature, music, etc., as an abstract structure, like the medical student who explores a skeleton without philosophizing about life and death and references to *Hamlet*. I am not sufficiently familiar with research in that area, however, in which *art topology* might have already found its place. I can imagine that "so what?" is the question often returned in response to a grant application in this area.

Art has the double-decker topology of a phone directory. At the basic level, the **potential** connectivity has the topology of full connection: in a work of art, anything can be connected or placed side by side with anything (or nothing) in plane or in 3D space, provided the laws of physical nature do not prevent it. If they do, the connections can be rigged up, as in Cornelia Parker's (and many other's [108]) suspended bricks. The "phone directory" itself changes over time: things and forms pop in and out. The **actual artwork** is like a conference call between several subscribers in the phonebook: a bundle of lines, a bag of dots, along Kandinsky, or a whole republic of small junk, along Sarah Sze. The connections can be calculated or random.

Ai Weiwei has set a totalitarian connectivity record with his zillions of sunflower seeds. Each of them, supposedly, is made unique, but all are trampled the same way by the visitors and their uniqueness and their craftsmen are of no consequence whatsoever.

[108] Exceptionally inventive Ken Unsworth did it in the 1970's.

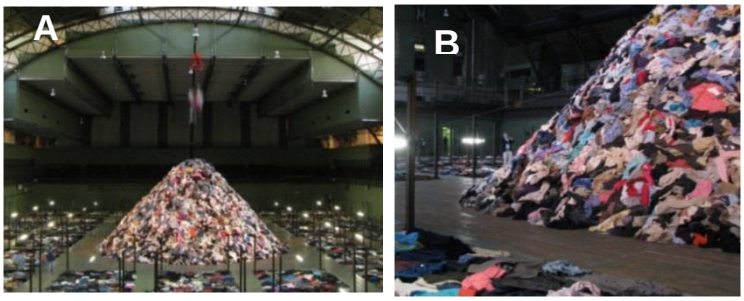
> Each piece is a part of the whole, a commentary on the relationship between the individual and the masses. The work continues to pose challenging questions: What does it mean to be an individual in today's society? Are we insignificant or powerless unless we act together? What do our increasing desires, materialism and number mean for society, the environment and the future? (Tate Gallery comments on the seeds)

Does Ai Weiwei criticize or exercise the pattern of totalitarian mistreatment of individuality? I see it as an example of the inherent ambiguity of modern art. This ambiguity is not some kind of moral shortcoming but a necessary component of freedom. It is order and control that requires clarity and precision, while freedom blurs the borders and erases them. We are free to like and to dislike, less free with political correctness, more chaotic without it. Freedom itself is among the most ambiguous terms that I know.

There is a much earlier *pattern mate* of Ai Weiwei in European art: Christian Boltanski (France).

> While creating *Reserve* (exhibition at Basel, *Museum Gegenwartskunst*, 1989), Boltanski filled rooms and corridors with worn clothing items as a way of inciting profound sensation of human tragedy at concentration camps. As in his previous works, objects "serve as relentless reminders of human experience and suffering" (Wikipedia).

His similar installation entitled *No Man's Land* was centered on a 25-foot-high pile of **30 tons** of old smelly clothes brought from a textile recycling plant. It was intended to remind about human mortality and the Holocaust in particular. There were also an arrangement of smaller piles, a wall of 3000 stacked old cookie tins, and a collection of heartbeat records, to which a visitor could add his or her own.



Christian Boltanski, *No Man's Land*, Park Avenue Armory, New York, 2010. Photos: C-Monster , Flickr, A and B .

Dorothy Spears' review in New York Times, 5/09/2010, ***Exploring Mortality With Clothes and a Claw*** was not sympathetic**:**

"…it's hard not to see it as a version of that childhood game, and as an embodiment of a similar, albeit more intense, kind of perplexity and heartbreak;

…large-scale exercise in futility…;

> His engagement with both death and survival has drawn glowing comparisons to the poetry of John Keats, and also been denounced — particularly when his fascination with the Holocaust is most evident — as pornographic and exploitive."

The piles of clothes of different size have been repeated by Boltansky many times, even amid the luxury of old European buildings, like *Monnaie de Paris*.

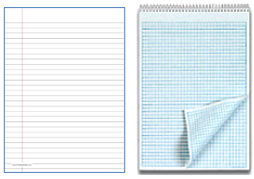


Van Gogh, *A Pair of Shoes*, 1886

As a contemporary of the Holocaust, I am itching to say something, but I cannot judge modern art: it has the shortest statute of limitation, if any at all.

It may seem that modern art is least of all interested in real life, but isn't art as curious about a can of cheap soup as Van Gogh was interested in a pair of worn shoes? Isn't *My Bed* the Van Gogh's *Shoes* today? Then it is worth of $4,351,969, considering its size and stuff.

I have already shared (ART AS BELIEF) my observation of *anchoring*: an subconscious yearning of abstract artists to send some signals of real life, like a word or two, a title, usually with no connection to the image, or a political or historical allusion. It could be some subconscious but recognizable content, like the grid or lined paper notebook in Agnes Martin's paintings. I go too far here, I know, but I can't stop.



To an educated eye, any abstract element of a composition evokes scientific and technological associations. Abstraction in sciences, natural or not, is what **cannot be seen**, but can be thought of. Triangle for me is a geometrical reality. Abstract art can hardly **surprise** me. It surreptitiously exploits the natural human desire of **recognizing** a comforting familiar image: cool safety of a dark cave, freshly painted wall of a room in a new home, motley fabric of a woman's summer dress, and dramatic colors of the sunset.



Art can be a bare wall but it still must have something to hang a hat on.

The future that art prophesizes is permeated with ambiguity. Dealing with believers, you never know what to believe and whom to trust. Each of your own beliefs has a shadow of a doubt. The professional knowledge is too arcane, so that you need an expert or mediator. Can you trust anybody in the world where you never certain who sends you an email: man or woman, friend or foe, computer or human, where inventions and technology are becoming double-edged sword and a universal key to all vaults because everybody is potentially connected to everybody and everything? A drone, which I have recently seen behind my window, the camera of my computer (I tape it over when not needed, following a professional advise which I do not believe), your smart time-gobbling phone (I do not have one), they want your soul, secrets, shames, and occasionally your very life. You are at the entrance into a prehistoric cave where the daily and nightly live of everybody is opened to all. You are where nothing is what it looks and nothing means what it says. You are the Naked Emperor who trusts the tailors. You are taking nexistence too seriously for your own good. A hard-boiled liberal, you worship your own pantheon (libertheon?) of nexistence. This is the topology revolution, started in art long before the digital revolution.



Jasper Johns, *Figure 2*, 1963

The choices of most fundamental historical patterns in the world and, coincidentally, the main American political choice, are as minimal as they can be: there are exactly **two (2)** of them: the **Red** and the **Blue** for America, rare **democracy** and prevailing **autocracy** for the world history.

I am being carried away on the wings of futurespeak, bye-bye….

"I want to connect the world" (Mark Zuckerberg , 2014) sounds to me like one of the most ominous mantras ever vocalized with the tacit "connect to me" rider.[109] It has been the ultimate goal of intensely material caliphates, empires, kingdoms, religions, Communism, Islamism, Putinism, and, on similarly ambitious scale, Amazon, Alibaba, Facebook, Google, and other benevolent behemoths, which we love to be petted by. I cannot deny that "connect" has been a mantra of liberalism, too, only with non-existent *we* instead of the full-blooded I.

I cannot imagine freedom in a super-connected world, all the more, the world where humans are connected with Things like a captive with his handcuffs, the keys in the jailer's pocket.

> Why am I so negative? I seem to be pulled into politics. Away from it! Back to the quiet of the museums and galleries! Back to my banished under the desk old (a few years) computer!

What has it to do with peaceful, self-absorbed, innocent, playful modern art? My hypothesis is that art has been prophetic and freewheeling ahead of the rest of economy because of its **freedom**: from politics, ideology, manufacturing, communication, banking, war, world conflicts, entrenched establishment, and, most importantly, from doctrines and propaganda. Where else can you find it?

So much for nexistence, but what is existence, by the way? Existence is everything from proven possibility to certainty. Anything that has **already happened** has a proven possibility, which is the same as to say that it is not new. The future, obviously, stays behind that line.



Existence: the deer down the road exists even if only a possibility.

When I hear the imperial edict "connect the world," which is not a dream but realistic intent, I easily imagine the connection as a tight Knot in which everybody and everything is as close to everybody and everything as in the cave of a prehistoric tribe.

Today, in 2015, it is clear that Things and humans are not separated by infinite distance in Jeff Bezos' Amazonia (which I am using with guilty satisfaction): they are looking at each other through the class-proof glass like two close species[110] that can already communicate by speech, all the more, gestures.



The future exerts immense power in a mystical and eerie way. It acts like the gravitation of celestial bodies, creating orderly orbits, and it works like heat, storms, and earthquakes, creating disturbance and chaos. The future plays with the fluid substance of human soul like the moon that keeps the fringe of the land wet under the push and pull of the tide. The future—sometimes taking form of the past—inflames human mind with tempting visions and chilling nightmares. It shapes individual fate and creates global history. Physical bodies, however, are completely indifferent

[109] Especially in the wake of terrorist acts in Paris, November, 2015. On liberalism, see *Essay 16, On Somebody Else*.

[110] See Charles Murray, *Coming Apart: The State of White America, 1960–2010* (2012).

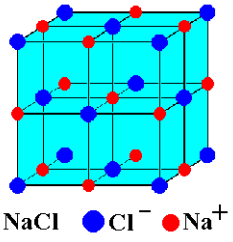
to it because physical laws, believe it or not, are immutable by our definition of them and by the shortness of human presence in the solar system.

Future, mind, soul, deity, art, belief, ideology—those are the strangest things that I know. I hesitate to call them irrational or transcendental because they are part of human nature, which is much more resistant and resilient than the ocean, land, and atmosphere of our planet under all the heavy material Things that crisscross, slash, and pierce it.

As for the future of art, its paradigm swing may come sooner than we think. The direction of a possible change is toward novelty, uniqueness, originality, humanity, constraints, and complexity as measures of value.

Modern art was the first human creation capable of connecting and reconnecting the world in a dreamy, reflective, and non-competitive way. The topological revolution that has been sweeping professions, occupations, institutions, borders, limits, beliefs, and the entire world order grounded in geography, meaning, and moral dichotomies, is what can be seen with a hindsight in the prophesy of modern art.

I see the future of the world as a continued topological tightening with the shrinking of distance between humans, Things, and ideas, good and bad, true and false, friend and enemy, help and harm, existence and nexistence. I see no universal brotherly love in that, neither do I miss it, except in a real family.



Please no association of colors with US parties.

We are in the World War 3 between democracy and autocracy with democracy in the state of a civil war and autocracies in their own global fights. Changing my position from artistic to scientific, no matter who wins, we will keep crystallizing in a lattice of humans and Things. In a crystal of salt, any ion—big negative chlorine or small positive sodium—has both kinds of neighbors in its close vicinity. Similarly, we will have all sorts of connections with benign and hostile species of civilization, mostly Things and humans, in a tight structure no more under human control. We will be always told that the fetters of connectivity look cool, make us look younger, and are good for us, yet some will never believe. We will be told in big red letters that the patriarchal past with topology of *pyramid* is “good for you," but the future still offers us at least a binary choice.

But at least *my home is my castle*, isn’t it? I was stung by the realization that the drones were the latest step in cracking open our castles and huts when a hummer had sailed right behind my window. Was it looking for *my bed*?

Almost 100 years ago, art had croaked “*Dixi*” in its kinky sign language.

12. DOES NEXISTENCE EXIST?

I have not studied the entire history of nexistence, except as a prominent feature of Russian history in the 20th century. It is quite probable that somebody, apart from Plato, Hans Christian Andersen, and Andy Warhol, has already heavily contributed to the subject. In modern times, neither Sartre's *Being and Nothingness* nor Heidegger's *Being and Time* has anything to do with what I call nexistence, unless you take the exasperating obscurity of both books as a kind of artspeak. Yet, while editing the already finished *Essay 60*, I have found some reports of three most recent (2015-2016) sightings of nexistence.

1. Peter Schjeldahl, the art critic of *The New Yorker* magazine, concluding his review of the recent exhibition of Robert Ryman [an abstract artist who used only white color for most of his life], writes:

> The emperor—roughly, high-modernist faith in art's world-changing mission—could retain fealty only if stripped of fancy styles and sentimental excuses. That was Ryman's formative moment. It was succeeded by a suspicion, now amounting to a resigned conviction, that contemporary art is an industry producing just **clothes, with no ruling authority inside them**. (*The New Yorker*, December 21, 2015)

2. In the concluding chapter of his heart-breaking, gut-wrenching, and mind-boggling novel *The Sympatizer* (Grove Press, 2015), Viet Thanh Nguyen writes:

> How could I forget that every truth meant at least two things, that slogans were empty **suits draped on the corpse of an idea**? (p. 355).

About the commandant of a re-education prison camp established by the North Vietnamese in the South Vietnam after their victory:

> He saw only one meaning in nothing—the negative, the absence, as in *there's nothing there.* The *positive* meaning eluded him, the **paradoxical fact that nothing is, indeed, something**. (p. 356).

3. The third sighting is a complicated subject, see Ben Lerner, *The Custodians* in *The New Yorker*, Jan. 11, 2016, on how the difference between existence and nexistence in art is blurred, but, anyway, both clinched fighters are being carried into "forever." This is how I see the problem, at least in part.

Modern art, made of or with chemically and physically unstable junk, can have a short life span. What to do with it? This is the problem the new Whitney Museum of American Art has to deal with. The answer is restauration: to **replicate**, enhance, rebuild, redesign, or remake the original in other ways.

The full title of the artwork by Josh Kline is "*Cost of Living (Aleyda)*". Aleyda is a real woman, a housekeeper of a hotel. Parts of her digitally dismembered body—the head, made as realistic as wax figures of Madame Tussauds, hand, and foot—are put on a standard janitorial cart together with cleaning and scrubbing tools of the janitorial trade, all that 3D-printed. It can be seen on the Web. The 3D scans could be stored indefinitely and used for the replication.



Josh Kline, *Cost of Living (Aleyda)*, 2014. Source: Paddy Johnson, ArtFCity.

It has been missed that even the scans must be somehow rejuvenated because digital equipment also progresses and the old files could become unreadable. Definitely, never say "indefinitely."

A similar problem arises with the unstable paint of Mark Rothko. For some of his large paintings, **replication** was considered, but the final decision was to project correcting multicolor lights on the painting.

What is the artwork which has been **replicated**, artificially enhanced, cloned, or recreated without the participation of the artist and, probably, after his death? Would it still exist?

Should the physical existence of a dead artwork be cared for like the bodies of Lenin and Mao Zedong in their mausoleums (if they are not already 3D-printed)? Do we need to prolong the existence of nexistence? Does the original work still exist in its replica? Does the artist remain the author of its replicated work? Is the cost of living of "*Cost of Living (Aleyda)*" worth keeping it alive? As Ben Lerner uses the term "veneration" regarding the attitude to the restoration of art objects, is modern art edging further toward an entirely Durkheimian religion? With tying art to political categories, are we using helium balloons as anchors?

I began to dig deeper for the roots of the "*Cost of Living (Aleyda).*" There must be some explicitly named nexistence, I thought. There it was, a really big nothing that was big something: capitalism.

Severed human heads, the precursors of "*Aleyda*," entitled "*Living Wages/Big Nothing*," were exhibited by Josh Kline as early as in 2004 at *The Big Nothing* exhibition of Institute of Contemporary Art (ICA), University of Pennsylvania. I quote from the source.

> **Ostensibly about nothing**, this group exhibition spanned several decades of production by over 50 international artists who explored **nothingness as the subject of artistic rumination** and negation as a creative and political strategy. The exhibition pondered the vacuity of contemporary consumer culture on the one hand with works by Andy Warhol and Richard Prince, for example, and on the other, sought to understand the **importance of the void in spiritual fulfillment** as famously exemplified by Yves Klein. [Yves Klein (1928 – 1962), French artist, see **Figure 4.2.** –Y.T.]
>
> ……..
>
> In recent years, Kline has developed a body of work about the body and labor in the twenty-first century. Speculating on capitalism as perhaps the **ultimate big nothing in our society**, Kline has created a new two-part project for *ICA@50* that looks at a FedEx delivery worker and his identity as a laborer in our economy.
>
> On a view at ICA is a series of sculptural portraits produced by 3D biometric scans of FedEx delivery person—an expression of Kline's ongoing interest in human capital and its role in our society.

It is difficult to sort out. Neither could it be brushed off, which is never recommended to do with nexistence, especially as elephantine as capitalism. Was the Davos Forum of 2016 , in fact, about finding the Abominable Snowman in the Swiss Alps and not about capitalism and the Fourth Industrial Revolution?

My *Essays à la Montaigne* are finished. But previously invisible nexistence, once captured and illuminated, now seems to be around every corner.

4. Here is yet another example. The almost 3000 years old ancient Chinese book *I Ching* (*The Book of Change*) is still fresh and in everyday use in the culture of China and South-East Asia. It is also a long-time teaser of the Western world. I quote the recent review by Eliot Weinberger of two of its modern translations into English (*What is the I Ching*? *The New York Review of Books*, February 25, 2016, p. 20):

> It [*I Ching*] is the center of a vast whirlwind of writings and practices, **but is itself a void**, or, perhaps, a continuously shifting cloud, for most of the crucial words of the *I Ching* have no fixed meaning (p.20).
>
> One could say that the *I Ching* is a **mirror** of one's own concerns or expectations (p.24) .

5. Finally, another attempt of ending this overstaying Essay.

In my youth I was taking my life lessons—as well as, much later, the inspiration for these Essays—from Montaigne's *Essays*. I was impatiently waiting for the next book of Sarah Bakewell whose *How to Live: A Life of Montaigne* (Other Press, 2010) I admired. Sarah Bakewell is unlike anybody else in the genre of biography, but it would take another Essay to explain why. Anyway, literary critics and readers have well appreciated her brilliance. Her most recent *At the Existentialist Café: Freedom, Being, and Apricot Cocktails* (Other Press, 2016) is now in front of me, finished, and even more impressive. For two days I was glued to it, reading about Edmund Husserl, Martin Heidegger, Jean-Paul Sartre, Simone de Beauvoir, Maurice Merleau-Ponty, and others, always feeling the presence of the author in the list of her characters (and even in the illustrations). Just one example: "Rereading him [Heidegger] today, half of me says 'What nonsense! While the other half is re-enchanting.'" (p.186).

The high tide of existentialism receded into history decades ago. This pervasive but elusive subject kept bothering me since I had first encountered it long ago and until Sarah Bakewell's book. I referred to Heidegger, Sartre, and existentialism many times in my Essays, especially, 18, *On Everything*, 27, *The Existential Sisyphus*, 29, *On Goil and Evod* , and 45. *The Place of Philosophy in Science* . For the first time, after many attempts, having unsuccessfully wrestled with *Being and Nothingness*, *Being and Time*, and even Wikipedia (!), I feel like I understand, thanks to Sarah Bakewell, what phenomenology and existentialism are, how the latter came from the former, how both were incubated in the same culture that hatched all modern arts, and how much the thin intellectual substance of that philosophy was fortified with the intense, tangible, sometimes even carnal human stuff of the personal stories of its notables bruised, one way or another, by the experience of WW2. I also understand why I could not understand it earlier.

Existentialism generated long shelves of non-fiction books (rarely comprehensible), subculture (usually insular), buzzwords (typically overblown), fiction (often pretentious), and theater (frequently absurd), but I quote Sarah Bakewell (p. 33):

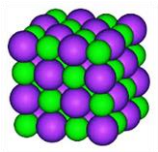
> **What is existentialism anyway?** Some books about existentialism never try to answer this question, as it is hard to define. The key thinkers disagreed so much that, whatever you say, you are bound to misrepresent or exclude someone. Moreover, it is unclear who was an existentialist and who was not.

This sounds like at least 100 proof nexistence. In the first chapter (p. 34) Sarah Bakewell gives a crisp translucent nine-point explication of what existentialism is about, which, in my view, without a slightest criticism of her, but with a great skepticism regarding her subject, is a collection of ultimate trivialities. The concluding chapter, almost painfully brilliant, conveys the measure of her own skepticism. But there is much more in her book than philosophy: a less known aspect of cultural history of the same period that witnessed the Cambrian Explosion of modern art. Philosophy, however, is a strikingly less pecuniary business than art. Money appears in her book only as strewn around by Sartre's generosity or needed to pay urgent bills.

In short, my idea of Jean-Paul Sartre's version of existentialism is: whatever you ask a philosopher's advice about yourself, the answer is the matter of your personal decision and responsibilities. Do not bug the sage. Look into the mirror at your own concerns or expectations. You are free to decide. You anguish, but do not brood for too long: decide and act.

With this scant personal extract, I welcome existentialism as philosophy to the realm of nexistence. Nexistentialism of *I Ching*, modern art, supremacism, nationalism, exclusivist ideology, and stern unforgiving religions create real powerful full-bodied **structures of something around nothing**, some of them bloodthirsty. But *I Ching*, modern art, and existentialism do not pit people against each other. Even the pumped up with brazen nexistence US Presidential Campaign of 2016 will end, hopefully, with exhaling all its hot air. The white Union horse, its coat a patchwork of blue and red spots, clanking with firearms, will chug along, in spite of gloom predictions, toward the next gasp, along the pitted and cracked national roadways.

6. Wait! Roadways? Roadways… Now, what about driverless cars? It seems like the case of **nexistence at the wheel**. This is a juicy morsel for a new philosophy of human/Thing condition.



Ideas—patterns of existence—never die. If I were a philosopher, I would return to the oldest problem of my profession: what is really real, reality or ideas? But I am, happily, a chemist.



2016

ESSAYS *à la* MONTAIGNE

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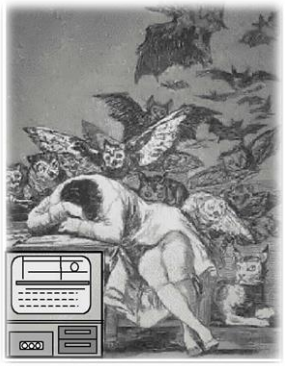
THE END

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Yuri Tarnopolsky

ESSAYS

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Essay 60. Art and Nexistence

Essays 1 to 59 (2001-2013):

http://spirospero.net/simplicity.html (contents and links to single Essays)

http://spirospero.net/essays-complete.pdf (Essays 1 to 56)

http://www.scribd.com/doc/11607864/Essays-Part-1 (Essays 1 to 20)

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Essay 57. THE FEW AND THE MANY , html (pdf)
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Essay 59, The Knot: Humans, Ideas, Things and Evolution of Ecosphere (pdf)

About the author: ***Memoirs of 1984*** **(http://spirospero.net/1984.pdf) . Website: spirospero.net**

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Yuri Tarnopolsky

Essay 60. ART AND NEXISTENCE

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2016

Demain n'existe pas

Tomorrow does not exist

Lara Fabian

1. ART AS ART

Essay 60 follows **Essay 59**, *The Knot: Humans, Ideas, Things and Evolution of Ecosphere* and completes my Essays. It is neither a source for art education nor art criticism. Intended as an illustration of pattern ideas, it is a selection of my subjective, biased, and fragmentary observations of a tiny part of modern visual art, taken from different, distant, and sometimes odd points. It should not be perceived as anything but an expression of my curiosity, personal taste, and opinion.

I tried to approach art in Essays 20, *On Artificial Art* and 39. *Painting the Ice Cream Soup*. In the latter, I wrote: "Irrationality is a precious gift of the artist and this is why art is a big mystery for the rational mind." I could not get half the mystery off my half-rational mind, however, and this is my concluding attempt to reconcile both halves.

I mean here by art, unless specified otherwise, the modern and, especially, postmodern visual art. My intent comes from my belief in prophetic abilities of arts. I am trying to understand what art is trying to tell me about the future in the language of shrieks, whimpers, and bizarre gestures for which we do not yet have appropriate words because words emerge from the past.

In my own private systematics, I divide all Western art history into four overlapping periods:

1. Ancient Art, including cave art.

2. Classical figurative art from the Middle Ages to its retirement after Haussmann's renovation of Paris, progress of communication and transportation, and decline of European aristocracy. Its maturity was shaped by Italian Renaissance. Experiments and mutations were always rocking the Classical Boat but not as wildly as to capsize it.

3. Art of the 20th century. It jumped out of the French Boat hit too hard by European wars and revolutions, industrial and otherwise. Wassily Kandinsky was its feisty ideologue, major contributor, and the First Prophet. His writings, among them *Point and Line to Plane* and *Concerning the Spiritual in Art*, attacked "conventional beauty" with the zeal of an ascetic preacher cursing carnal sins.

4. Art market of the post-WW2 revival and the Age of Affluence in the West. Andy Warhol, the Second Prophet, left his unambiguous Analects (*The Philosophy of Andy Warhol*) that erased from the definition of art everything but money.

The two last periods, especially, the Third Millenium, comprise what I mean in this Essay by art. Of course, its roots grew in the two previous ones. The cave art of France could be taken for postmodern art if discovered in a basement of a deceased reclusive artist.

Modern art, like modern culture in general, is fundamentally experimental. The words *fundamental* and *experimental* make an uneasy couple, however. Experiment in science is supposed to make foundations stronger and expand them. Perpetual experiment in art reduces the foundation to the simplest rules of the game, unchanged since the Second Prophet. Yet it is the spirit of the game that makes culture such fun. As for science, it has its own fun and beauty, but there is a huge difference: art is the body of all art ever created, while science is its own perpetually sharpened cutting edge, like the smile of the Cheshire Cat over the receding body.

Art in this Essay is the art of the headlines, multimillion sales, scandalous exhibits, world fame, and delirious or baffled reviews. This is a small part of the whole Art. There is also the huge but invisible, unless you run into it like into an iceberg, the underwater art of small galleries, local artists, art fairs, festivals, flea markets, garage sales, affordable internet sales, and "commodity art" that can be ordered online by your specifications or instructed to do-it-yourself like a true abstract expressionist. The daylight of attention and memory still reaches the surface layer of Whole Art where the most significant interesting original artists, alive and departed, rest among empty dollar hooks and where I had from time to time the treasured feeling of life that was radiating warmth into my face.

The underwater art represents the entire history of art, its daily content, purpose, and function on the wall or a floor of human edifice, as value, status symbol, and decoration. It supports the presence of art in the cultural atmosphere of the nation and not just in its elite chambers. It is not represented here for the reason of its big size and underwater location, from which it watches attentively, jealously, but skeptically the events above.

> **NOTE.** In this Essays, using almost exclusively Internet sources, I looked for images with appropriate license for my post-stamp size illustrations. In its absence, I am relying on the principle of fair use and loss of detail in small images. The images play the role of buttons leading to original sites. Some well-known art is truly generic on the Web. In any case, the name of an artist alone is sufficient to conjure, with Google, his or her entire artistic heritage, as well as life and foibles.

Figure 1.1 shows a few artworks with the same unambiguous figurative content: horse (see also *Horses in Art*). To me they symbolize the eternity and unity of art,[1] which, as a true time machine, never forgets its past stored as material artifacts and not just verbal ruminations. With Google, the storage is searchable, but you need to know what you are looking for. The Web is full of dark corners with art surprises.

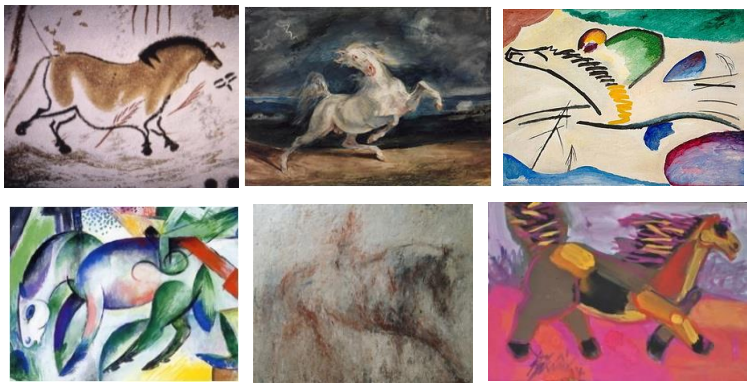


Figure 1.1. Horses.

Top: A horse from Lascaux cave, *ca*.15000 B.C.; Eugene Delacroix, *Horse Frightened by Lightning*, 1829; Wassily Kandinsky, Rider 1911. Bottom: Heinrich Campendonk, *Horse by the Lake* (detail), 1915; Judy Buxton, *Grey Horse* , *ca*. 2000; Do Phan (Đỗ Phấn), *Horse*, 2014.

While classical painting was well represented in Russian museums, the "bourgeois modernist" art was repressed in my Soviet time. It could be seen only through some cracks in the boarded up Russian windows on the world. Nevertheless, I was loosely familiar with its main directions and they failed to excite me. I had missed the striking evolution of art during the last 50 years and its turning into an economic phenomenon. In America, only the Internet gave me access to true modernity, which looked anything but "bourgeois." I have been immersed into Web art for the last three years. I am still making discoveries, like Richard Pousette-Dart (1916 – 1992) and Alfonso Ossorio (1916 – 1990), but it is difficult to surprise me.

Arts, especially music and poetry, have been as much my spiritual oxygen as chemistry and science. Classical music was the first arts wave that rolled over my head very early, in high school. It was more accessible than any other art in Russia. Poetry was the second, although the best of it was for a long time forbidden and later hard to find. I never missed a chance to visit art museums in Moscow and St. Petersburg (then Leningrad), but the absolute majority of my impressions were from reproductions.

The Web, planted with tollbooths on the highways to movies, music, and literature, leaves images free to look at, as a kind of billboards along the roads. Of course, it is not the same as art face to face, but one can get some idea. Anyway, I do not pretend being a connoisseur of art.

With all its exclusivity, visual arts—painting, sculpture, installation, and performance—are more accessible on the Web than other arts, although as an undersized, flattened, and often miscolored surrogate, with no assurance of reality like the smell and sound of a museum, gallery, or even a city square. The digital images, nevertheless, carry much more content than the shadows in the Plato's cave. Besides, although many modern originals lose very little on the screen, which reveals something unflattering about them, the size is always the irreplaceable loss on the Web.

[1] I wonder if anybody asked the question why the animals in cave pictures are realistic while human are schematic. If no one did, I do. As for horse, can anybody see it as prophetic hybrid of life and machine? I can.

The Venice Biennale of 2013 and Sara Sze's exhibition *Triple Point* there suddenly opened to me a deep space of which I had been largely ignorant and dismissive. Irritated and prejudiced, I entered the halls of fame and infamy of modern art and I am now leaving them, impressed, almost reconciled, and definitely grateful. My reason took a good refreshing rest in this odd niche of our civilization. To lose it would make our life much poorer, like the sky robbed of the Milky Way by city lights. I never saw the Milky Way in America or anywhere else except in the sky over a completely dark Ukrainian village of my college years.



Deep Space (photo by Robert Franke)

Art opened to me a view of the whole spectrum of pattern concepts and themes addressed in these Essays. Now, saturated with impressions, I am anxious to look behind visible horizons at what can never be seen, touched, and posted on the Web and yet is in highest demand, especially, as long as it either looks and smells good or just gives you goose bumps and makes you panic. It is the future, the epitome of ultimate and unquestionable **nexistence.** Tomorrow does not exist. And yet it does.

I want to use art as a *pattern window*, unobstructed by technology, into the future of the *Knot* of **Essay 59**, i.e., the future of all of us: humans, ideas, Things,[2] our pets, toys, and fetishes, our masters, slaves, friends, enemies, buttons, icons, shortcuts, accounts, and whatever else might spring up in the man-made ecosphere of the Third Millennium, A.D.

One of my first discoveries was Barnett Newman.

A large painting of a vertical white line on a blue background, *Onement VI* by Barnett Newman looks like a window with curtains drawn together. Having in mind that the painting was sold in 2013 for $43.8 million at Sotheby's, New York, what could we see with the curtains parted? Is there anything behind? What if there is something non-existing, which is neither something nor nothing: **nexistence**, as I will further call it? I use this contraction of **non-existence** for anything that cannot be perceived by human senses, may not make any logical sense, yet is a source of either debate or agreement, or influence on earthly matters, with a great real power, or even being a cause of war.



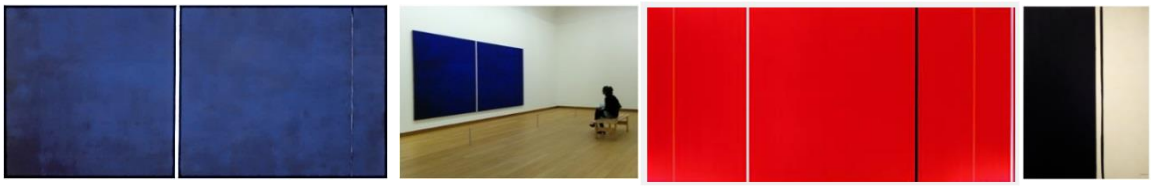
Barnett Newman (1905-1970)**,** ***Onement VI*** (1953; 102 x 120") **and its counter-abstraction (concretization?**).

I see the world as patterns[3]: similarity airways between distant continents and worlds. One of them connects *Onement VI* with a photo of a curtained window. In this case, a **similarity** can be recognized by most observers. I am interested in what is not visible to eye, however, and, especially, cannot be sensed in principle, even with most sophisticated technology.

[2] I capitalize man-made Things as an evolutionary domain, on par with humans and ideas; see **Essay 59**. To capitalize also humans and ideas would probably make more sense, but they do not evolve as fast as Things.

[3] Patterns are typically regarded as stable regularities. Pattern Theory of Ulf Grenander and my chemical background guides me to the intimate mechanisms of pattern instability and change typical for human history and individual human situations. See Introduction to Pattern Chemistry.

I am intrigued and excited by what does not exist at all yet exerts force like some physical field, shaping the present and the silhouette of the future. I want to understand it. What can we see through the slit in the Newman's curtain? I will come back to it in the end. Meanwhile, I am using an opportunity to present more of Barnett Newman, **Figure 1.2**. See also his *Stations of the Cross*. Much more can be found on the Web, for example, Christie's lot notes accompanying *Black Fire*.



A **B** **C** **D**

Figure 1.2. Barnett Newman (1905-1970): A, B: *Cathedra* (1951), sold for $12 million in 1997, **C: *Vir Heroicus Sublimis* (1950-1951); D: *Black Fire* (1963),** $84.2 million in 2013. **B**: Photo by Autopilot, from Wikipedia.

Modern visual art is, probably, the only man-made object on earth that can be taken entirely by its face value. What is art? Is *Onement VI* art or wall painting?

"What is art?" This has been a simple question if limited to classical art. With modern art, which accompanied, somewhat trailing behind but looking far ahead, the emergence of modern industrial civilization, it is not so simple. The already *post-post*-industrial civilization is on its way but it has not yet arrived. It is like a mathematical expression with the opening bracket (but no closing one. If we trust sci-fi prophets (I do), it will be appropriate to call it post-human. And if we trust modern art as prophesy, we are coming to the same conclusion, watching the shrinking presence of life, human body, passions of the soul, and surrounding nature in modern art.

A regular commercial urinal, a pile of rocks or pieces of bread, dead animal, industrially made and bent gigantic sheet of steel, a canvas chaotically splashed or evenly covered by a paint of single color (monochrome), an unmade and untidy bed—is all that art?

Art is more than what you **believe** it is. My position regarding art as a whole is: everything that is called, presented, exhibited, advertised, handled, sold and bought, as well as forged, stolen, and destroyed as art is art. I will repeat this mantra, with a few variations, more than once in this Essay.

There is no art but art and to make art is an art in itself. But why is this art so different from the so-called classical art of all centuries before the twentieth one? What does this pattern of transition mean for the entire domain of human exystem? Does the all-you-can-eat art buffet symbolize some radical unique turn of history? Can anything like that happen in social life (the loss of Federal Powers over the disUnited States of America) or science (synthetic life that, as Craig Venter promised, can create life forms without a preceding evolutionary history[4])?

[4] "Synthetic biology frees the design of life from the shackles of evolution"

Reviews of modern art exhibitions or particular works, whether landmarks or new and obscure ones, are often written tong-in-cheek. One can clearly see the critic's bewilderment and vacillation between masked mockery and forced dutiful praise. Yet the apparent duplicity is not necessarily cynical. I can understand that perception of art even by a seasoned professional strongly depends on the viewer's mood, state of mind, personal memories, and even the weather outside. For a common viewer, the artwork seen for the first time is the best approximation of an accidental exchange of looks that could start a personal relationship after mutual ground testing.

There is no generic definition of art the way we define bread or bicycle because there are no limits to the variety of the tangible stuff of modern art. The world of art is huge but insular. It is the strangest domain of economy, an industry in which to produce more may mean actually to produce less: a unique object in a single copy for a narrowest segment of consumers, often, made with minimal labor, hired labor, or no labor at all. It is the kind of work where to be innovative is to repeat the same pattern, with some predictable variations (like the size of the iPhone?). Art is where speaking about art means composing phrases that have dozen possible meanings or no meaning at all. Is it the multi-speak, the descendant of doublespeak? Squeak-speak? Shriek-speak?

Like an astrophysicist, observing the stars and planets in deep space, hopes to trace the origin and the future of our solar system and planet Earth in it, I believe that art can tell us something about where we are and where we are all going as civilization. I believe in the prophetic power of art because art tells us, in a kind of sign language, our future before we can even invent words to describe something new and never seen and heard. As for "traditional beauty," it is abound in the lower tiers of the art world and some of it, not much, seeps up to the top.

"Art is what you believe it is" or "what is sells as art" or "art is nexistence" cannot satisfy anybody whose professional habit is to ask meaningful questions and answer them in a non-circular way. Art has monetary value and seems to be made of matter, which sounds like it is brimming with existence. Next, I am going to look at art from those two angles.

2. ART AS MATTER

So, here we go again. Repeat after me: art is what is made, called, exhibited, and sold as art even if somebody says it is not art.

Is that so? If that is true, art is as much a matter of belief as a matter of matter. "A matter of…" is a figure of speech, but belief is not about matter. Doubt is the signaling smell of belief, its pheromone. If the believer stands firmly by his faith, then he will doubt your beliefs and, occasionally, his own. Yet the palpable and measurable physicality of art is unmistakably and unconditionally there. It is a thing like any other and it does not need any belief to assert its existence. Why is it so difficult to define art in a non-circular way? Moreover, it is difficult to speak about art as we speak about bread, stone, money, and the fabric of everyday life, even though all that can be the stuff of art.

Modern art reveals to public in the ornate and gilded Klimtesque attire of *artspeak*. Here is a small taster of its vocabulary:



Gustav Klimt, *The Kiss* (1909). From Wikipedia

Abstraction, aesthetics, aggression, allusion, ambivalence, awareness, beauty, challenge, concept, context, controversy, creativity, declaration, depth, efflorescent, elemental, elusive, elucidatory, emotion, energy, exaltation, existential, expressive, ferocious, gestural, glyphic, harmony, humanism, imagination, individualism, innovation, inspiration, intensity, interpretation, invocation, irony, libidinal, meaning, motivation, muscular, mystery, mythological, melancholy, noble, palimpsest, poetic, pivotal, projection, purity, reference, rejection, scatological, signature, somatic, space, speculation, spontaneity, subjectivism, sublime, sumptuous, symbol, syncretic, syntax, talent, taut, texture, visceral…etc.; "dwelling on the threshold," "silent space between and around words," "mobilization of the space between reading and seeing," "bondage to form," "bounteous exchange," "brutally human," and more.

The most primitive, crudest, and offensive piece of modern art can still be presented and analyzed in artspeak. *Mea culpa*, I fall into *myspeak*, which is no better.

Rarely can we find something that contrasts with artspeak as much as this quote from a fiction book about art:

> "…on the one hand fun, sex, kitsch, innocence; on the other trash, death, cynicism.[5]"

I realize that almost any review of art, music, and book is a balancing act for the professional critic. I rarely read art books and reviews, except in *The New Yorker*, where nobody wants to be hurt by falling off the high wire. Yet Sarah L. Thornton's book *Seven days in the art world* (2009) lets you sneak into modern art world through the back door. In her later book *33 artists in 3 acts* (2014), she sets the matter straight from the start: "Artists don't just make art. They create and preserve myths that give their work clout" (page XIII).

I have noticed two outstanding art reporters: Jonathan Jones, *The Guardian* (UK), and Sebastian Smee, *The Boston Globe*. I now suspect that artspeak has a range of dialects, some of them intelligent, serious, and delightfully ambiguous. Reviews of Peter Schjeldahl in *The New Yorker* can offer the artist a Greek gift with stratospherically higher artistry than their targets.[6]

Art, however, is not what anybody says about it. Art appears to a viewer as honest man-made and often defiantly raw matter. By physical materiality I do not mean the properties of the medium of artwork which today varies from excrement to gemstones, from brick to bread, and from cadaver to live flesh. I mean that, whatever we all say or hesitate to say about a piece of art, it is a **thing** that takes space, has mass, can move or be moved, reflects or emits light, smells, sounds, and can be licked to taste it. Moreover, this thing, like you and I, is not made in thousands of copies and, strictly speaking, cannot be considered Thing: a loop of the Knot (**Essay 59**), on par with humans and ideas. It is unique by definition, although it can have twins, clones (prints), close variations, and imitations. Modern art grows in big and supportive incest-ridden families, but not without divorces and remarriages.

No electronic microscope can find any harmony or melancholy in the cracks of paint. You can be invited to put an artificial paper-on-aluminum stone on your windowsill (Sarah Sze in Venice), walk on art and occasionally steal it (Ai Weiwei at Tate Modern), and annoy or hurt the artist (Marina Abramovic, Naples, 1974). You can put your finger on expression, harmony, and mystery, but only metaphorically. The X-rays and electron microscope may help with suspected forgery but are mum on the poetic, romantic, and libidinal.

Paintings, sculpture, and installations can be seen, touched, weighed, measured, appraised, mangled, and kept under lock. In market economy, art is tangible investment: something you can lay a hand on, literally, not metaphorically. Tyrannical regimes, religions, and ideologues can proclaim art subversive and ban or destroy it, even together with the artist. Yet art could replicate and spread because artists borrow from each other, paying back in the currency of fame.

[5] Michel Houellebecq, *The Map and the Territory*, Knopf, 2012, p. 129.

[6] "When I think of Richard Serra's work as art, or of art as what Richard Serra does, a bracing bleakness descends, like that of a stern northern region, where people live gladly, while under no illusion that it's the isle of Capri." Peter Schjeldahl, *Industrial Strength*, *The New Yorker*, 2007/06/11, p. 146

Originality is power, but so is similitude. Photography, initially the threat and then the blessing of visual art, combines both and turns one into the other.

Performance art is witnessed and recorded on films and digital media. Reproductions are more like reductions, but they make art available to those who, like me, are far from museums and galleries.

Art is as different as framed squiggles and splashes of paint, rusty sheets and rods of steel, heaps of refuse, pointless human labor, sleep before an audience, countless paintings of apples, lilies, parallel lines, and color blots. The heart-squeezing Rembrandts, monsters of Goya, self-mutilations of Francis Bacon, Raphael's *Madonnas* —all those things are art. As we have no choice but to accept all the gore, greed, glut, and glory of human history, we have to accept art as art whether we like it or not because it **is** history. It is the future that we can squabble about.

Obviously, I dislike a lot of art. Modern art, which I am trying to understand, forces me to look at myself and try to uncover the reason of my apprehension. My habit of a chemist to ask the childish question "what is it made of?" could be part of the problem. I need to look at the backside of everything and take things apart down to atoms.

Figure 2.1 illustrates the physicality of art.



Figure 2.1. Art as thing. Left to right: Michelangelo, *David*, front and back; Van Gogh, *Bedroom*, front and back; Richard Serra, *Fulcrum* (steel); Ai Weiwei, *Sunflower Seeds* (porcelain).

Yet as money has lost its exclusive materiality so has modern art. As an image or a video from a digital file, even the purebred material art becomes less material—or sometimes more so when it involves live matter, as performance art does. Modern art can be made of anything, including nothing, and the borders between something and something else dissolve in modern art as in a dream.

Modern painting uses a lot of historically new stuff, like anything that can stick or be glued to any vertical surface, from elephant dung (Chris Ofili) to gunpowder (Cai Guo-Qiang). "Anything" says it all. Thus, Mark Quinn (UK) has been making realistic sculptures of his own head from his frozen blood.

In addition to "anything," modern art has added a whole spatial dimension with the genre of installation, which is the same "anything" but in 3D space. The fourth dimension—time—is put to work in mobile sculpture and variations on the theme of flowing liquid. I think that metabolic life can be considered the fifth dimension of art, as it is in theater and circus.

Cai Guo-Qiang created an installation so awesome that I am out of both artspeak and myspeak (Google: **Cai Guo-Qiang Head On**). This could be a case for silence in talking about art.



Cai Guo-Qiang, *Head On*. Photo: Tony Hisgett , Flickr.

But I can't shut up. I ask myself: Are the wolves "we" or "they?" Are the wolves made of sheepskins or dog skins? Do they hint to "a wolf in sheep's clothing?" Does the glass wall allude to the Great Wall of China or the wall of censorship (you still can make it transparent)? I like art that prompts questions other than "is it art?" and stimulates my brain. It is the practicality of an engineer.

I mention *Head On* here because, being completely immobile, it manages to unroll in space and time. The probable trajectories of each of the 99 wolves can be traced from the next room to the glass wall.

There is also a one-dimensional art of geographical and, therefore, time-consuming magnitude. The *Running Fence* of Christo and Jeanne-Claude runs on the spot for almost 25 miles across hills, ravines, and roads from Northwest of Petaluma to Bodega Bay in California. The enormous size of this ephemeral and quickly extinct creation is counterbalanced by miniatures and the microscopic art accessible only under magnification (**Figure 2.2**).



Christo and Jeanne-Claude, *Running Fence* , 25 miles. Sonoma and Marin Counties, California, 1972-76 (Smithsonian).



Vincent Gandia (1935- 2009), Miniature etching, 2" by 2" including the margins.

Figure 2.2. Size in art.

It occurs to me that installation by its very "anything goes" nature never looks as authentically abstract as point, line, or a color field in panting—the flat Mother Earth spans under all kinds of art. Installation can be regarded as a transformation of flat painting. Abstract art, which, along Kandinsky, should be just "points" (fields) and lines on a plane, instinctively wants to have flesh on its thin bones.

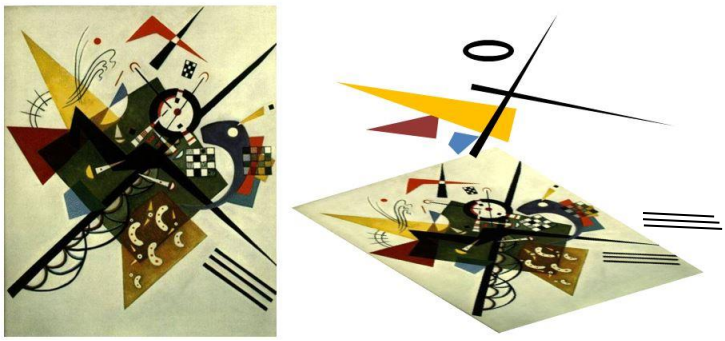


Figure 2.3. Wassily Kandinsky (1866-1944), *On White II* (1923) and its partly deconstructed 3D "pile" pattern.

How can everything develop from nothing and anything from something? This is the topic of the chapter ART AS TREE, but it seems appropriate to give a fully speculative illustration here.

Figure 2.3 shows one of the most famous paintings of the one of the

most famous founding fathers of abstract art: Wassily Kandinsky, *On White II*. To me it looks like a **pile** of flat abstract forms seen from above, i.e., a projection of a 3D object onto a plane. Why pile? First, the figures overlap in a sequence so that the lower ones can be seen through the semi-transparent higher ones. Second, the center of the picture has the highest density of the figures. It seems that we could take them one by one from top to bottom, as if it were a pile of cards and toothpicks. Could we turn it into installation with a 3D printer?

When I began to immerse myself in the tickling waves of modern art, I found it as much daring and innovating as dull, repetitive, and mutually imitative work.[7] The worlds *modern*, *avant-garde*, and *experiment* for anything as old as modern art, which already is well over 100 years old, are really misleading, even if it has been made today. It is now a mature, entrenched, and conservative movement that deserves, desires, and dreads a **new**, real, full-blooded and sweeping avant-garde. This is where the future lies, prepared to jump in on us like the wolves of Cai Guo-Qian. But will the glass or (the Great Chinese) wall of money stop and scatter them, tails between their legs?

How can you create anything new in the genre of anything? I call this conundrum "the trap of anything goes." Whatever you create is not new: it is just different version of the same.

Pile is a popular and already iconic genre of modern art. There are piles and heaps, and stacks and mounds, and piles of piles, some of them shown in **Figure 2.4.** I shun here the esteemed sub-genre of trash and poop piles.

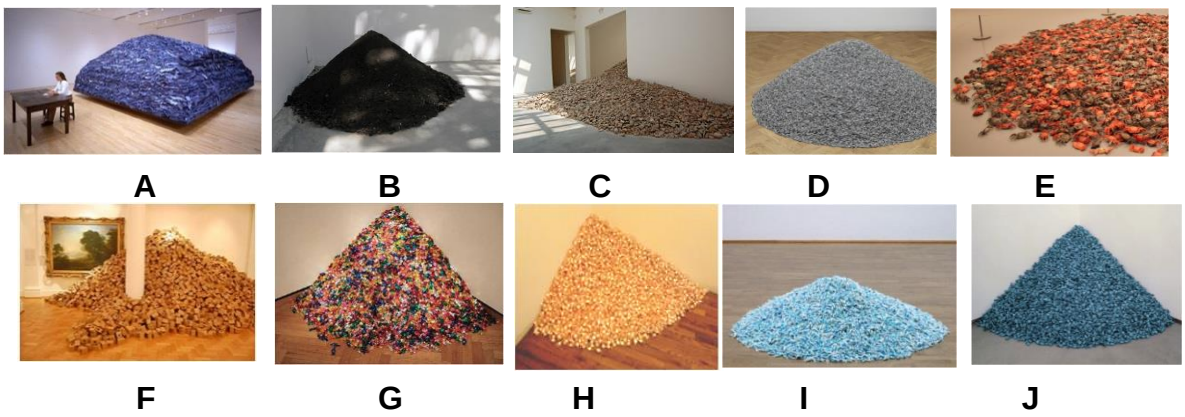


Figure 2.4. Piles. A: Old denim clothes (Ann Hamilton); B: dirt, C: gravel (Lara Almarcegui); D: porcellain sunflower seeds , E: ceramic crabs (Ai Weiwei); F: Yellow bird boxes (Carwyn Evans); G to J: Felix Gonzales-Torres, *Lover Boys*, wrapped candies displayed at four out of many different exhibitions.

Pile presents an interesting case from the point of view of complexity. If it is large by the number of components but homogenous by composition, is it complex? I classify it as simple. It can be described in a few words and made with little mental effort. If a big physical effort needed, the teamwork in art is not mortal sin.

[7] I am sure the boredom and monotony goes up with higher rankings of the artist, but I cannot figure any objective measure for boredom. In principle, monotony can be measured as an average distance in configuration space.

I believe that complexity, mental effort, physical effort, and uniqueness (originality, inventiveness) are the main components of the artistic value. It is my personal belief, it tells something about me, not about art, and I will come to that in ART AS MIRROR. From this point of view, the lack of effort looks like the chronic anemia of modern art. The pile art form is an old hat but it is in vogue because it is both easy and respectable as new retro. I am mean, I know.

Modern outbursts of minimalism—from giant steel labyrinths to polished steel toys—try to compensate for the simplicity and monotony with oversizing and industrial technology. This explains why modern art has only a few biggest stars: the lightning in art typically comes from a loud bang, not *vice versa*, as in the nature. In the business of technology, the winner takes (almost) all.

Proclaiming the unfettered combinatorial self-expression, Kandinsky caused an incurable affliction of art. The abstract combinatorial pattern space, contrary to the promise of freedom, presents an extreme restriction. Once you (or maybe just people like myself) have seen a couple of configurations, you (at least I) have seen them all. The digits from 0 to 9 generate all possible numbers. If you saw ten digits, you saw all numbers. It is only for the mathematician working in a particular area of number theory that all numbers are different. The problem of modern art is pernicious aging,[8] for which the best remedy is not to talk about it. Besides, in art, age is an asset.

Even though the combinations can never be exhausted, the simple principle "anything goes," further fortified by Warhol, is becoming a totalitarian dictate.

This is something Marcel Proust anticipated, in my opinion, when he wrote:

> We invariably forget that these [beauty and happiness] are individual qualities, and, mentally substituting for them a conventional type at which we arrive by striking a sort of mean among the different faces that have taken our fancy, among the pleasures we have known, we are left with mere abstract images which are lifeless and insipid because they lack precisely that element of novelty, different from anything we have known, that element which is peculiar to beauty and to happiness.
>
> (Marcel Proust, *Within a Budding Grove*, translation by Moncrieff, Kilmartin, & Enright; Modern Library, 1998, p 318)



Constraints in visual arts are never as tight as on the balance beam in gymnastics, rhymed poetry, or musical performance. Yet from the cave beginnings of art, there was a powerful constraint of likeness of the picture to its object, even if the object was a fantasy. Even a weak subconscious click of recognition connects the picture with the **viewer** who would otherwise pass it over.

[8] As Peter Schjeldahl writes in *The New Yorker* (11/09/2015) about Frank Stella (born in 1936): "Even groundbreaking ideas have life spans". I gratefully add to my artspeak collection *cynosure*, *apothegm*, *deathly glamour*, and *more strenuous than ecstatic* from his article. But, unlike typical artspeakers, Schjeldahl can be really critical and get to the bone, if not to the very heart.

Naturalistic likeness retains its downsized and renovated home in art. Most non-representative artists have their own constraints, too, which I would call self-similarity constraints ((Piet Mondrian and Mark Rothko are stellar examples of self-similarity boredom, I am adding sacrilegiously in double parentheses)).

Marcel Proust casually noted the role of constraint in arts:

> My mother was obliged to stop, but she derived from this very constraint one more delicate thought**, like good poets forced by the tyranny of rhyme to find their most beautiful lines:** "We can talk about her again when we're by ourselves," she said softly to Swann.
>
> *Swann's Way*, Translation (heavenly done) by Lydia Davis, 2003, p. 24.

"If you never tasted slavery, you never know freedom." Self-imposed constraint is masochism, but no slavery. It is mastery.

The solid constituents of pile art—soil, gravel, stones, candies, bird boxes, tiny figurines—cannot be arranged exactly the same way twice. Piles allude, unintentionally, to Heraclites' "you cannot step in the same river twice". Pile art is as much fluid as it is solid (typical artspeak, but true). Thus, bulk rice and coins are solid but conform to gravity and the shape of the container.

A pile can be just a part of a complicated scene. The pile ***A*** in **Figure 2.4** serves as a centerpiece of the installation *Indigo Blue* (1991, 2007) of Ann Hamilton, which I, a sceptic, like it more than I like to say. It is irresistible.

> In the center of the space, a 17' x 24' steel platform was piled with 14,000 pounds of blue work clothing. Built layer by layer, the pile was formed by smoothing successive strata of pants and shirts until a volume of clothing the size of a semi-truck was formed. At the back of the space, obscured from view by the pile, an attendant sat and erased slim blue books at a table borrowed from the central market, which formerly housed one of Charleston's pre civil war slave markets. Using a Pink Pearl eraser and saliva, the books were erased back to front. The eraser waste was left to accumulate over the duration of the piece. Although the space was entered at ground level, a window accessible in the small upstairs office of the garage gave another view of the pile of work clothes and the activity at the table. One wall of the office was hung with udder-sized net bags of soybeans that sprouted and later rotted in the leakage of summer rains. With the humid weather, the space was filled with the musty smell of the damp clothes and the organic decomposition of the soybeans.

I can say why I love it: the installation is a dense complex web of associations in which Things, humans, and ideas (Knot of **Essay 59**) are bound tighter that men and serpents in *Laocoon*. It is a complex act of thought constrained by logic and links with reality.



Tobaron Waxman, *Lehem Oni. Prusa (2006)*.

Tobaron Waxman's installation *Lechem Oni / Prusa*, which means "the bread of poverty, sliced" in Hebrew, is a pile of 400 glycerin soap bars. A comment says:

"Lechem oni - prusa invokes iconic Holocaust imagery with the intent of criticizing the misappropriation of the Holocaust as a means to bias mainstream

opinion. The artist makes the soap bars in the gallery, encased in each bar is a piece of hand-made matzah baked by the artist in the traditional manner in a matzah factory. The soap bars are then assembled in piles, recalling the piles of Jewish belongings and Jewish bodies discovered at concentration camps, with the soap itself an allusion to the Nazi practice of making soap from the fat of Jewish bodies."

I, a contemporary of Holocaust, better abstain from comment. OK, I have one. Abstract art, to escape boredom, is desperately seeking some kind of anchor in real life. It can be a reference to natural scene, trendy idea, political protest, historical association, national icon, celebrity, pop merchandise, etc. It tells me about the genes of advertisement in the DNA of modern art. Abstract art needs nutrients as much as the artist does, but, asking for bread, **you** expect to get a rock. Or a candy, if you are at the right place.

Ai Weiwei's zillions of handmade sunflower seeds, unlike his aggregations of 6000 stools and 1000 bicycles, were presented in piles, as well as in the form of a field or, rather, shallow pond.

What did Ai Weiwei want to say with his sunflower seeds? I saw various interpretations, most under constraint of political correctness, others critical. Here is what his work tells me.



Ai Weiwei: Sunflower seeds. Left: Chinese craftsmen paint the seeds; right: Visitors trample the seeds at Tate Museum.

When I look at the photo of the field/pond of seeds opened to visitors to walk and sit on at the Tate Gallery exhibition (2010), I think about the Chinese porcelain craftsmen who for two years were paid to paint millions of seeds with a tiny brush. I perceive Ai Weiwei's project as a mockery of human reason and work.[9] It is my strictly personal interpretation. I do not intend to put down the artist or anybody else. This interpretation may not say anything about the work, but, again, it says something about me. I belong to the generation of people who believed in the sacred value of human work and lived in a country where this sacred work was either symbolically paid civil duty or forced labor. This is nothing but my belief. The problem with belief is that there is **no way to find out** whether myself, the artist, and the critic really believe what we all are saying, all the more, what it means. This is what **nexistence** means, why it is not nothing, and how it moves human hands, can sustain life, and can kill.

The reason why I cringe at some modern art and wince at another does not have any objective connection with the art. It is my reaction to it. Art can be an undecipherable self-expression of the artist, to which we have no clue, artspeak or not, but it is also a self-impression of a viewer, to which nobody else has a clue, either. Modern art and modern public are playing volleyball over a brick wall, never really seeing each other. Just myspeak. More about this later, in ART AS MIRROR.

[9] See Evan Osnos, *Age of Ambition: Chasing Fortune, Truth, and Faith in the New China*, (Farrar, Straus, and Giroux, NY, 2014) on Ai Weiwei.

The piles of Lara Almarcegui do not look revolutionary in a lineup of piles, **Figure 2.4**, but neither are they as primitive. She exhibited similar piles at Vienna Secession in 2010 and in Rotterdam in 2011 and there is a story behind her work that is truly relevant and can be trusted, which is unusual in art. The piled up materials are the actual components of exhibition halls. The weights of the piles reflect the real proportions of the components. She deconstructed it somewhat similar to the way I tried to deconstruct Kandinsky's pile in **Figure 2.3.** See more about it in ART AS STONE.

From stone to its absolute opposite: life. **Figure 2.5** illustrates art made of human body, but not the body painting.



Figure 2.5. Art as living matter.

Janine Antoni, *Slumber* (1994). She sleeps in the gallery for 28 days while an EEG machine records her REM patterns. She then weaves them into a blanket from her night gown under which she sleeps. Source.

Tilda Swinton, *The Maybe*, 1995/2013, MoMA. Listed as: "Living artist, glass, steel, pillow, linen, water, and spectacles." Photo by M Liao. More photos.

Petr Pavlensky, *Carcass*, May 3, 2013. "Assistants brought him naked and wrapped in a multilayered cocoon of barbed wire to the entrance of the Legislative Assembly of St. Petersburg. "

Although already desensitized to modern art, I lost my equanimity for a moment at the sight of the otherworldly actress Tilda Swinton (I am her visceral fan) sleeping in a glass box as a component of her installation *The Maybe* (1995 and 2013) at New York Museum of Modern Art (MoMA). The explanatory note listed her among other material evidence: "Living artist, glass, steel, mattress, pillow, linen, water, and spectacles." The living artist, however, was absent most of the time and was supposed to appear without warning. Therefore, her **absence** was as much part of the installation as presence. As the museum staff explained, the **uncertainty** was part of the **concept** of the appropriately entitled artwork. I had a sweet tingling feeling of deep ambiguity. I instinctively felt charmed by the inventive power of art. The platitude of both idea and its realization was *post factum* evident but woman's body always adds a level of complexity to anything around it.

The Maybe was created by Tilda Swinton and Cornelia Parker. The latter also worked with stone (ART AS STONE). Cornelia Parker has, probably, the widest range of imagination and sense of material among all installation artists I know. She works with body, stone, metal, fabric, meaning of words, and pure nexistence in the form of physical absence! I, entranced, surrender to her art without vacillation, like Odysseus to Circe, with the magic herb of doubt just in case.

I was also greatly impressed by the fearless and adventurous Janine Antony. Her *Slumber* (1993, 1994) was inventive, complex, and poetic, combining scientific and vaguely fairytale motives. In *Slumber* (1994), Antoni[10] lives in the gallery for 28 days. While she sleeps, an EEG machine records her REM patterns, which she then weaves into a blanket from her night gown under which she sleeps. More about her.

Petr Pavlensky represents conceptual street art in its extreme form and in a most oppressive kind of environment. The origin and style of his techniques could be recognized by those familiar with self-mutilation of convicts (not by political prisoners, whose craft is hunger strike) as protest in Russian prisons. Here is a description of the act:

> On May 3, 2013 Pavlensky held a political protest action against repressive policies of the government. His art performance was called *Carcass [Tyuа]* . Artist's assistants brought him naked and wrapped in a multilayered cocoon of barbed wire to the main entrance of the Legislative Assembly of Saint Petersburg. The artist remained silent, laying still in a half-bent position inside the cocoon and did not react to the actions of others, until he was released by the police with the help of the garden clippers.



When on November 9, 2015, I saw the headline "Controversial Russian artist arrested after setting fire to the door of secret services building," I knew it could be only Petr Pavlensky.

The ephemeral and sometimes masochistic genre of performance art has a substantial and fascinating history with roots in theater and family entertainment (*tableux vivants*). The radical and disturbing Marina Abramović is the leader in balancing on the edge.[11] There is a documentary about her: *The Artist is Present*. She says that performance art, unlike theater, is for real.

Modern art is literally anything you can call art and exhibit as such, and yet a few artists are always more daring and inventive then others without being vulgar, offensive, or scheming. But would I feel sympathetic to "lady in the glass box" as a concept if I disliked the actress instead of being her admirer? I emotionally accepted *The Maybe*, but rationally, I saw the specter of futility and dehumanization hovering over the absolute majority of modern art where humans play the parts of Things. That was when I suspected that I never see art *per se*. It is always the image in the center of the whole web of my individual intellectual an emotional associations, memories, preoccupations, and even current physical sensations. In other words, art is a mirror, and the mirror right now shows me myself, holding the poster "Add *homo sapience* to Red List"



[10] A Ph.D. thesis on Janine Antoni: Stephanie Ann Karamitsos, *The Art of Janine Antoni: Labor, Gender and the Object of Performance*, 2006.

[11] Some of Abramović' experiments involve interaction with public with results, to no surprise after the "Zimbardo experiment" (also known as "Stanford prison experiment," 1971), that human crowd is naturally distributed between sadists and saints. This contradicts the assumption that the prison environment is the main reason for cruelty. Bullying is another natural experiment. See documentary *The Artist is present*, 2012.

Art is as tangible as rocks and bodies. You do not need to understand it, just touch the stretched out of nowhere hand of art. You will feel, however, that it is not the same as touching the warm living body. In spite of all experiments with nothing, modern visual art—painting, sculpture, installation, etc.—is overwhelmingly **thingish**, geometric, calculated, man-made (sometimes, industrially), and corporeal without any trace of the **soul,** except, probably, in environmental art, with its life dimension. The double nexistence of the spirit and matter in the minimalist outgrowth of modern abstract art is truly awe-inspiring. On the contrary, the full-bodied necrophilic art (Damien Hirst's animals in formaldehyde and Gunther von Hagens' plastinated human corpses) is as material, real, natural, solid as any exhibit in a museum of natural history or the notorious *Fountain* of Marcel Duchamp, which is not even the original urinal but its substitute. Even an elephant in brine, however, could not compete in my eyes with the absence of Tilda Swinton on her bed, still losing the warmth of her body. Am I really saying that?

As for Andrey Kuzkin's, *Whatever is out there* , 2010, (movie) I do not know what to say or think. No, he is no rival to a fully dressed Tilda Swinton. But it is art, too. Say the mantra.

3. ART AS MONEY

Every great artist, writer, composer, inventor, and scientist was driven by instinctive fear to repeat something already done and known. Innovation is the magnet that separates the iron filings of greatness from the wood sawdust of mediocrity.

Why could the skimpy, defiant, arrogant, and violent novelty of the first abstract painters become routine mainstream with historically breakneck speed, while similar extreme innovations in music and literature are still confined to minuscule audience (to which I, now proudly wearing the badge "I have read *In Search of Lost time*," belong)? Not expecting to find an indisputable answer, what else can I do but to keep searching for it at a place where Everything rubs shoulders with Everybody: the marketplace?

There is art and there is art market.

Visual **art for art's sake** (*ars gratia artis*[12]), cloistered in palaces, temples, museums, and mansions, protected from elements and thieves, looks like the most exclusive, hermetic, and immutable human creation, removed from social turbulence, politics, and in fact, from anything else people care about, need, make, and consume. Art has little utility, but it has value. As for utility, in hard times—war, occupation, illness, cold winter—selling a painting could save life and burning could at least make a cup of hot tea[13]. Nevertheless, it is in good times that art sells for the highest price.

[12] The Latin motto appeared not in Antiquity but during the Industrial Revolution.

[13] In good times, in a novel *You Should Have Known*, by Jean Hanff Korelitz (Grand Central Publishing, 2014), a woman explains her attraction to a man: "He has a Rothko!"

Money circulates through the large arteries and tiny capillaries of global civilization. Art market is one of the body's minor organs, like the spleen, and, however insular, it needs blood. Being just a man-made Thing[14], art displays a mysterious special relation with money, something like the relation between the body and the soul, only I cannot decide which is which. In a way, art **is** money, if we skip squabbling over what "is" is.

The price of entry into museums is affordable or even free on some days. Visual arts are better accessible on the Web than published scientific papers. Sculptures, occasionally scandalous or baffling, challenge the weather and vandals in parks and squares. Yet art today is anything but *gratia artis.* It changes hands for weighty, even if digital, wads of money.

I believe in the penetrating power of image. It is not slowed down by logic and syntax. It invades mind as unstoppable front of parallel armed columns. It works its way forward, ringing the bells of associations in unpredictable manner. This is why I illustrate my Essays with small pictures instead of extra paragraphs. It is a habit of a chemist who thinks and converses about molecules not in mile-long chemical terms but in pictures. Here are two images to the point in **Figure 3.1**.



Figure 3.1. Soup can and yacht, one of each.

Andy Warhol's painting (actually, photo-transferred screen print) Big Campbell's Soup Can with Can Opener (Vegetable), 1962, 72 x 52", was sold for **$23,882,500** at Christie on November 10, 2010 and the **Eurocraft 44 Explorer** yacht, 144' 04" could be ordered for **$18,417,000** in 2015, to be built next year. I wonder how much Andy Warhol's painting of that yacht could cost.

Although *Big Campbell's Soup Can with Can Opener* "is a highly important and rare early painting by Andy Warhol showing the great icon which quite literally changed the course of Post-War Art: the Campbell's soup can" (quoted from Catalog), the price is baffling because neither the content nor the form are in any way unique, all the more, artistic. Many people do it every day in advertisement industry and some keep the original in the pantry. What is unique and artistic, we are told—and Warhol insisted[15] (and I agree)—is the very fact that it is **presented and sold as** art. It is a masterpiece of self-advertisement. Any masterpiece has a golden aura and, even if it is art robbery, can inspire a masterpiece of a movie.





Napoleon is famous (among other merits, as art plunderer) and I am not a bit surprised that his hat, one of several remaining ones, was sold in 2014 for

[14] Here is a difference between thing and Thing. In performance art, exemplified by Marina Abramovic, the human plays the role of a thing, but the whole performance is a Thing because it is designed for income. Capitalized Thing is a super-species in the realm of economy, of which humans and ideas are two other super-species.

[15] I highly recommend Warhol's *Philosophy of Andy Warhol (From A to B and Back Again)*, 1975, available online . It is a revolutionary *post factum* manifesto of modern art.

$2.4 million. The hat caps the enormous historical shadow of Napoleon. But a picture of a soup can?

Andy Warhol's revolution in art was his declaration, influenced by Marcel Duchamp and others, that artist should obey only his own impulses, not necessarily artistic. The artist does not owe anything to anybody. On the contrary—and that was his own contribution to the doctrine—the buyer owes money to the artist for the result of his work regardless of content. The belief in the value of the work is its true content, which is to say that the artist himself, his life, escapades, sufferings, quirks, and, last but not least, financial status can be the exact content of his artwork, whatever is there on the canvas. We will come to that in ART AS BELIEF. Naturally, this content jumps to the largest value after such a grand event in artist's life as death.

I apologize. Sorry, sorry! I am ashamed of my retrograde juxtaposition of art and yacht. I was repeating the argument of the Duchess de Guermantes in Marcel Proust's *In Search of Lost Time* (*The Guermantes Way)*:

> There was nothing else in the picture, just a bundle of asparagus exactly like the ones you're eating now. But I must say I refused to swallow M. Elstir's [a fictional artist whose prototype was Édouard Manet] asparagus. He wanted three hundred francs for them. Three hundred francs for a bundle of asparagus! A louis [20 francs], that's as much as they're worth, even early in the season.[16]



Édouard Manet (1832-1883). Bunch of Asparagus, 1880.

The soup can is a kind of a triple point where (1) art, (2) art market, and (3) food market meet, quite like in Manet's *Asparagus*. Still, I ask myself the following question: what was exchanged in the sale of Warhol's work?

Both Manet and Warhol, separated by 100 years, had been ridiculed and both ultimately triumphed, although against different historical backgrounds. Both found supporters during their lives. Both were vilified for their techniques as well as for the choice of subject. Yet my personal impression is that if the legacy of Manet can be discussed in such a way that the opinions of experts gravitate to a certain consensus, any interpretation of the legacy of Warhol seems to be as true (or false) as ten others. For example, the can **opener** has been interpreted as a symbol of violence. Why not as a bold venture that had **opened** a whole new continent of content? Why not the sharpness of art that uncovers the meaning of everyday rot?

I think we have to give Andy Warhol another half-century to mature. It is yet a half-opened can. But it is already huge money.

With eyes already attuned to art, let us now look at money, a frequent and dear subject of Warhol.

[16] (Marcel Proust, *The Guermantes Way*,translation by Moncrieff, Kilmartin, & Enright**,** *Modern Library, 1998, p.686)*. There is a real story behind this episode. In fact, the painting was sold for 800 francs, but that was not the end of the story.

As compared with 3D sculpture and installations, the lower grade materiality of 2D painting gives the art form additional similarity with money. The material art is less material in painting. The materiality has potentially some further way to go down.

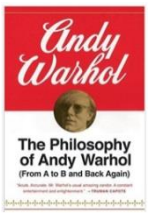
> There were reports that the ultra-rich keep "billions of dollars' worth of fine art and other treasures" in freeports where their materiality—and taxable value—may hardly ever be explored by human touch. "Under the freeport's rules, objects could remain in untaxed limbo, in theory, forever." Sam Knight, *The Bouvier Affair*, *The New Yorker*, Feb. 8&15, 2016.

There is a noteworthy investigation of the profitability of art for artists: Jonathan Jones, *Do rich artists make bad art?* (The Guardian, 27 April 2006) . The title question exemplifies the fundamental problem of art: **what is bad/good art?** This question has no answer. All we can agree on is the *fait accompli* of the sales history.

A single framed painting is neither good nor bad. It is a leaf on the evolutionary tree. It is a point in history. It is a point on a numerical scale. Art as a system (exystem: evolving complex system) is not as numb as it may look in a gallery: it breathes, moves, morphs, and tries to catch your eye with flirtatious makeup. With such signs of robust muscular life, art is truly abstract in the sense that its only measure is the latest sales number.

Picasso and Warhol were two, among many, pinnacles of modern art who had been considered "bad" art in the beginning of their careers. Pablo Picasso (1881 – 1973) produced over 10,000 paintings, many of them priced later in millions of dollars. Using a great variety of techniques, he also made ten times more prints, some in 500 copies and some in much less. There are hardly any high rank prints on the market below $1000 and rarer prints cost ten times more. Picasso printed his own money, one could whisper, multiplied by posterity many times over. He hardly used it himself, however.

Picasso the misogynist does not excite me as artist.[17] But I am certainly a misfit: I am bored even by most of Mozart, as I am confessing ahead of ART AS MIRROR. Andy Warhol, as all pop and minimalism, repels me—something I should probably keep in the dark as a shameful secret, as if shameful secrets have no value in our days.



When Andy Warhol (1928 – 1987) died, he left over 90,000 works, including 4,100 paintings, 9,000 drawings, 19,000 prints, and 63,000 photographs. This makes his creations, often deliberately cloned—like his posts stamp sheets of multiple Marilyn Monroes or Campbell soups and pictures of money—closer to paper currency or mass products than anything else. Money was his obsession of which he left a record in his *Philosophy of Andy Warhol*, where money is on the foreground. Here is a quote:

> I like money on the wall. Say you were going to buy a $200,000 painting. I think you should take that money, tie it up, and hang it on the wall. Then when someone visited you, the first thing they would see is the money on the wall.

[17] Jonathan Jones cites Picasso's warm relationship with Lee Miller as evidence that he was not a misogynist. But his portraits of the American photographer, not to mention all his other pictures of women, mean in my universe that he was. Jonathan Jones admits the "cartoonish cubist freedom" of those portraits in which Picasso's "art suffers."

In our times of great income inequality (as if there ever were times of equality), it is curious to read Warhol who saw a can of Coke as a unifying and equalizing symbol: millionaire or not, everybody drinks the same Coke (I do not. Long ago, I used to drink Pepsi.).



Andy Warhol, "200 $1 bills," 1962, fragment

In 1962, Andy Warhol, on his ascent to the status of a megastar of American pop art, painted, rather creatively, 200 $1 bills on a silk screen. He did not even paint each bill, but multiplied the initial batch by a special procedure. The large painting looked as a yet uncut rectangular sheet from the press of US Bureau of Engraving and Printing. In 2009, after prolonged languishing in a private collection, it was estimated at $8,000,000-12,000,000 but sold for $43.8 million at a Sotheby art auction in New York to an unidentified buyer. In the catalogue, it was presented as a "monumental masterpiece," one of "testaments to a pivotal moment in art history" and "a form of art that would remove the hand of the artist."



Andy Warhol, *Roll of bills*, 1962

At the same auction, an untitled 1962 drawing of a roll of dollar bills tied with a string, also by Warhol, was estimated at $2.5-3.5 million and sold for $4,226,500. Warhol also painted the dollar sign $. The very idea of painting numbers and signs was not new by that time.



Jasper Johns, *0-9*, 1960

Jasper Johns is recognized as one of the greatest modern artists. In the 1960's, he painted, among other mundane objects, letters and numerals. A set of his ten 27′ x 21′ color lithographs, a painting of one numeral on each (1969), was on sale at Christie's in 2014. Estimated at $400,000 – $600,000, it was sold for $485,000.

The modern greatness of the three above-mentioned modern artists is undisputable.

There is an unrivaled degree of unanimity about money on earth. There is no such agreement about human life. The world believes that money is always good and the more the better. This is, probably, the only ecumenical belief not stained with doubt, in spite of the frowning Bible with its camel and the eye of a needle.

The nominal value of a money bill is undisputable because (1) it is numerical and (2) it is printed on a solid thing that cannot change its appearance spontaneously or by somebody's wish. It is like an art print on good old-fashioned paper, not a submissive digital file to be processed in a photo shop.

Art is open to endless and irreconcilable arguments about artistic value. Money (for money's sake) is not. A number, accompanied by the same currency sign, cannot have two interpretations. That 2 >1 or 345 < 543 is always true by definition. Not many other things can be as uncontroversial. We do not argue which day of biblical creation was which: they are numbered by Creator himself.

To deal with zillions of numbers, all we need is the distinction between MORE and LESS and the ability to compare any two numbers in those terms. If neither MORE nor LESS applies, the numbers are EQUAL. Computers run on such simple principles and teach humans not to care whether number 10 refers to people, commandments, sins, or soup cans.

In contrast, the value of an artwork other than in terms of money is never consensual and it changes with time. The money-art-value relation involves the uncertainty caused by differences between humans, as well as by circumstances. The flow of time, if too fast and turbulent, changes everything without warning.

There are strong bonds of similarity between money and art. They did not exist when images were painted on the walls of caves and temples. Paper money looks like a picture, has a signature and a unique number on each bill, and is made by printing, like artistic prints. Money is printed by billions (36.4 billions of US notes in 2014, to be exact), paintings and prints can be produced by thousands—the difference is only quantitative.

The framed "money" of art wildly differs in the value of its "banknotes." Still, by "printing" this kind of money, a few artists could make significant fortunes. Art is not a disposable stuff like old paper money. It is not in constant circulation and is protected against damage. This advantage rarely works for the artist whose life is too short. Productivity can prolong the life of the struggling artist but may not be enough to shorten his struggle. Mass production is an inspiration for any artist who, having tasted success, is sick and tired of struggling.

More lasting than ships, bridges, and some buildings, art is the closest object we can find in the vicinity of immortality.

Art can be stolen, which is never easy, always risky, and requires an artistry of a special kind. But the greatest advantage of art money today is that valuable artwork cannot be hacked! Having just finished *Future Crimes* by Mark Goodman (Doubleday, 2015), the latest compendium of cyber horrors, I begin to think that the worldwide art frenzy is driven, subconsciously or not, by a promise of digital safety. Some compare it with the Dutch tulip mania of 1630. Nonsense! Tulips perish and paintings do not. And if they did, modern art could be perfectly forged and imitated because it possesses the never before appreciated potential of ultimate simplicity and self-similarity. This is why minimalism flourishes. Am I carried away? Yes. Maybe not. Definitely.

If painting of money is art, so is paper money *per se*.

Money is designed by artists. The last French and German money before the euro displayed national creativity in arts and sciences. In the German set of paper money before euro, five out of eight bills were related to arts, and the rest to science. The 100 DM (1990) was dedicated to Clara Schumann.

The French 100 NF banknote (1998) was dedicated to Paul Cézanne, who painted hundreds of apples, alone and with other fruit, throughout all his life. It had his portrait and a reproduction of his *Pommes et Biscuits* (*Apples and Cookies*). The previous 100F (1991) was a tribute to Eugene Delacroix.

The euro banknotes follow the trend in an ingenious oblique way, showing architectural styles and bridges: the heritage and the very idea of the EU, although bridge is as much a symbol of division as of aspired connection.



Pre-euro French and German money.



Minimalist money. Germany, 1923.



20 francs, France, 1877

Illuminating the essence of art as uniqueness, paper money can be investment of the same kind as art if it is sufficiently unique. Thus, a US $1 bill with a rare number like C00000001C can cost thousand times its face value on collector markets.

Classical art was like gold: it was difficult to mine and born miners were rare. With the advent of the Industrial Revolution, demise of aristocracy, rise of mass production, growth of middle class and free professions, accumulation of "new money," spread of media, photography, and kitsch, intensification of urban life, the long centuries of classical monumental glory looked overshined by the coins given to Monet for his *Asparagus*.

Art had to undergo some adaptation in the spirit of Industrial Revolution, pick up some soot and dust, and mangle the freewheeling sophistication of natural forms to fit the minimalist geometry of engineering. The mutant and mutinous experimental monsters survived and became mainstream after a historically short fight. The gates opened wide to new art, not photographic, not traditional, easy to make, in abundant supply, but extremely unequal in its market value, with a very narrow flat top of a Mexican-style pyramid where big money was changing hands. In the age of advertising, the novelty and apparent absurdity of extremists worked well for the art as the whole.



The new way of making art more difficult to mine and keep up its value was to let artists compete in running up to the top of the pyramid of success, which is what markets are for, indifferent to what exactly you are bringing to marketplace, just bring your rank of success. Modern art is the product of modern competitive business, i.e., the interplay of productivity, supply, and demand, with each of the three capable of being manipulated. The artists, accomplished or potential, were reassured: "You can make it. Even if you are not Leonardo da Vinci, you could be compared to him and treated likewise."

Art remained elevated to the spiritual realm and surrounded by a tribe of worshippers, but the spirit was changing, it seems to me, toward a kind of Paganism—the most democratic religion of all, in which you choose, woo, and pet your god and no distant absentminded God decides whether to punish you or reward for your uniqueness or ordinarity.

Elite can exist only on the shoulders of a big crowd. With the intoxicating vapors of luck and lottery in the air, competition animates promotion, patronage, publicity, and polemic. An establishment of experts grows between the artists and the public. Art expertise and sales becomes art. Art becomes economy. Art comes closer—but not too close, not too sweaty—to sport.

> Does art market duplicate stock market? There is an ongoing discussion on this subject. The difference between art market and stock market is obvious but not overwhelming: absence of volume (exactly one item at an auction—not one thousand identical copies) and absence of an objective measure for the value of art. Yet there is a curious similarity. Both business companies and artists have the so-called intangible (non-monetary) component of the valuation, which is mostly guesswork. For example, in case of Apple, Inc., it is its reputation, fame, rumors, ego, and its performance art of self-presentation. In case of art, everything but sales history is intangible: reputation, fame, rumors, ego and theatrics. Although the demand for art is miniscule, regarding the number of buyers, liquidity in times of affluence seems unlimited, while the term "liquidity" does not make full sense: the acquired piece will not be resold with any immediacy.

Alchemy does not work with gold, but it works wonders with art. Andy Warhol formulated the law of art alchemy this way:

> "Well," I said, "it doesn't mean if you don't believe in nothing that it's nothing. You have to treat the nothing as if it were something. Make something out of nothing." (*Philosophy of Andy Warhol*).

The "nothing treated as if it were something" is what I call *nexistence*.

The art transformation happened not because there had been any ideology and leadership. It happened because (1) mutations of the classical canon had been accumulating, (2) photography had taken over the pictorial function of art, (3) expansion of free professions had created the audience with a feedback, engagement, influence, new tastes, and new wallets, and (4) a new canon, a new DNA, loosely summarized as ART IS ARTIST'S SELFIE or MAKE SOMETHING OUT OF NOTHING, turned out viable. Every artist can paraphrase Louis XIV, "*L'Art, c'est moi*!" Every beholder of art can say the same (I can), but that will be the subject of ART AS MIRROR, where I will promote the viewer's own *L'Art, c'est moi*!

Anyway, modern art is among the most benign area of human activity and its freedom is unrivaled. Unlike medicine, it is not marred by side effects. You can take it in any dose or not at all.

I cannot expand here in this direction because I am neither art expert nor art enthusiast. My main interest is to "understand the world," as Ulf Grenander formulated it, in terms of patterns, not facts. Art is part of the world and I am trying to understand it on my terms. The good side of this undertaking is that I begin to see myself better, although not in a better light, while I see art in a better light, although through tinted glasses.

The realm of patterns, similar to mathematical formulas, only with the sign of similarity instead of equality, is unlike the solid, detailed, and provable professional knowledge. The patterns are small, simple, long living, indifferent to interdisciplinary borders, and cheap. The latter is, probably, the main detractor of their appeal. Can you get a grant for studying the Everything? If you can, wouldn't you need the whole Fort Knox for that?

Patterns emphasize not just similarities but also differences. I do not expect professionals to welcome pattern thinking: that would undermine the value of expert knowledge the same way photography had undermined realistic painting. But do not worry about realists: they turned to hyperrealism to make their own work difficult and have achieved stunning, even if ← disturbing, results.



Ron Mueck, "Mask II" 2001-2. Photo: John Haydon

Traditionally, art should be "mined" by manual labor requiring rare skills, complex techniques, expensive materials, and significant time. It was not intended for resale but could be given as a gift, and could linger for centuries in churches, palaces, and private buildings as part of personal wealth and memory. The difficulty to mine it from the canvass or a block of marble was a large part of its value, the rest being the ability of viewers to recognize the source of content: personality, character, story, nature, thing, situation, parable, illustration, abstract idea. In other words, art was inseparable from craft and reference to something outside art.

While art had been undergoing transmutation from gold to "fiat," a similar process happened to money. Most money today does not exist either as animate or inanimate matter: it is a **state** of atoms in microscopic grains of matter stored by some institution: bank, mutual fund, brokerage, etc. Unlike matter, which cannot be easily created or annihilated, the **state** of a tiny spot on a magnetic tape, disk, or chip not only can be changed practically effortlessly, but also changed back and forth as many times as the manager (or a hacker) wants. And not only back and forth: it can wander all over the numbers from zero to trillions and more (I do not believe in infinity). This is something unprecedented in nature. Try to curl back an uncurled staple. Reversibility is unnatural. Patterns of history, however, are reversible, as modern Russia exemplifies. The American North-South divide persists today as the Blue-Red one: it is the pattern of divide and, if you want, the Abrahamic religious divides—there are quite a few of them—could be examples on a global scale.

A number as big as 1,000,000 is just a lineup of just **20** such spots: 11110100001001000000. It is still a **small** system and it can be brought into any of its 2^{20} states with just a few finger taps. You cannot do such things with large natural objects and systems. Nobody can turn a $1 paper bill into $2, although you may believe it is the essence of business.

Money today is information plus the ability of the government to keep it truthful. Information today is nothing like the clay tablets[18], stela of Hammurabi, or flammable books. It is just the **reversible** state of matter. The new reality and the essence of our era is that information is created and changed by a **reversible** process, with **irreversible** consequences. This has resulted in the current chaos of hacking and insecurity bringing us back to the night dangers in a medieval city or on a forest road.

No one can have full control over irreversible processes typical for evolving complex systems (*exystems*). One can maintain a pattern over significant time, however, which, probably, together with the ability to change or reverse the pattern, is a definition of human power.[19] Patterns are reversible. As for such evolving systems as arts, only a few despotic regimes have shown any burning desire to control them.

Money is based on trust in the power of the ruler or government—the money artist who makes physical money. Electronic money is still a new element on the surface of the Earth. I do not see any proof that anybody has—or can have in principle —a full control over any **reversible state of matter**. If somebody has brought matter in that reversible state, somebody else can bring it back or elsewhere. Digital money is as different from the however inconvenient material money as chess position from chess figures. Can that be true about modern art, which is always—and often monstrously—material? Art is not reversible, but its value is.

If human mind is just a state of matter in the brain, it can be manipulated and toggled even though the phenomenon of memory makes the state of mind only partially reversible.

In the states of mind attuned to something existing independently from us, existence sounds alarm when we deviate from sensual perception into nexistential fantasies. In the states of mind attuned to *nexistence*, the alarm bell is silent, even if doubt—the satellite of every faith—is quietly humming.

Money is not just numbers in ten colors. The terrain of money is as varied as the surface of the Earth. It has mountains with summits in clouds, jungles full of snakes and predators, prairies, and rivers that replenish the seas of liquidity and loss, sustaining life, work, and fraud along the way. Moreover, the terrain changes from day to day or by the hour.

Money is abundant but it takes a lot of work to make, unless you already have enough of it and do not need it for a few years. Given time, money breeds money like sheep and goats, the ancient form of currency. The hedge of the sheep corral was a precursor of hedge fund.

Until recently, portraits of "money artists" used to symbolize the power of coins and bills. Money, a piece of paper with pictures, is an equivalent of power, luxury, sex, and even beauty. Power, however, is also a universal currency: the head of state and the terrorist are trading in the currency of human life and fate. There is a poignant similarity between brute power and ethereal digital money: they are cheap to put to work. Bullets are as cheap as small change and they can

[18] Sumerian and Babylonian clay tablets were, in fact, recyclable by soaking in water: the oldest precursor of computer memory after writing on sand.
[19] Note that such definition grants to robots equality with humans.

do their job as efficiently as taps on the keyboard. Threats can ground a giant airliner and empty the schools of a metropolitan area. One can say that digital power was the first way to operate states of matter, if "digital" is used in its original Latin meaning: made by using fingers. In human matters, the fist has been probably the very first both currency and power.

The comparison of art with money (Google "art as currency") nests snuggly in my tuned-to-patterns mind. What makes people collect banknotes, not even very old, with odd serial numbers? What makes them collect art? What makes them pay $38,000,000 for a painting of a vertical white line on a blue background? There is a whole genre of paintings presenting straight lines, vertical or horizontal, on a monochrome background. There are monochrome paintings without lines or anything else. Tom Sawyer could forge as many of them as you want and, probably, enrich the genre with masterpieces of his own. Poisoned once and forever with patterns, I see all minimalist masterpieces as just one—masterpiece, anyway. This is, probably, not the right attitude for any art lover. Am I really one? I sound like a bigot. See, money makes you lose your head like alcohol does.

Art market is an exclusive and peculiar place. Christie's art auction is a Carnegie Hall into which one cannot get by exercise.

In art market, the seller does not need to persuade the buyer that the artwork will do some indispensable exciting job like Google Glass, Apple Watch, or Viagra. It has its own ticker, Artnet C50, comparable to major stock exchange indexes, and individual entries marked by the names of artists as if an artist were a company, which for some top artists is a quite exact characterization. There is a description of how the index is calculated.

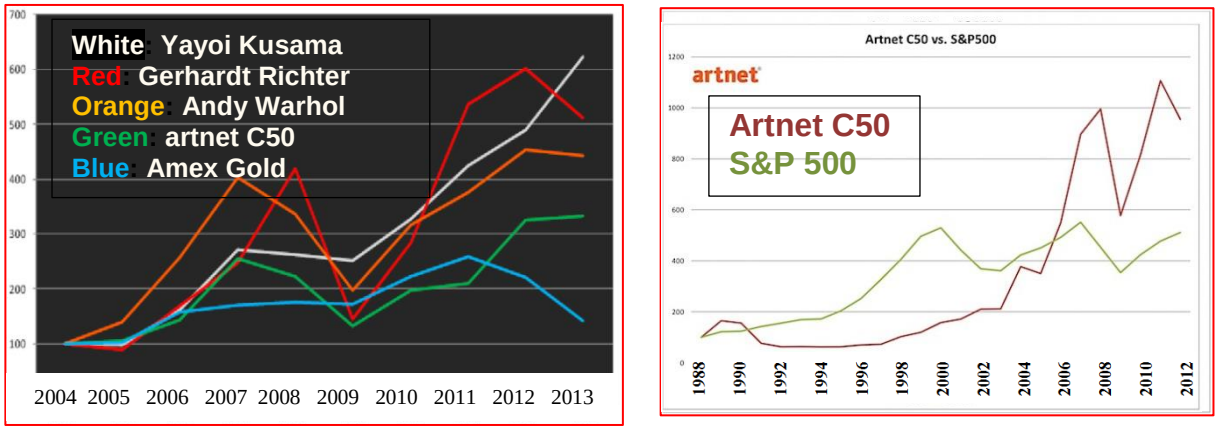


Figure 3.2. Art market. Left: artnet indexes of three artists *vs* artnet C50 and Amex Gold, 2004-2013. Right: Artnet C50 *vs* S&P 500, 1988 to 2012.

Figure 3.2 shows two modified index presentations of the art market compared to market indexes of gold and S&P 500. There is a discrepancy in C50 between both, as well as a distortion of Amex Gold (HUI) index.

The crucial difference between any individual artist's index and major stock market indices lies, again, in different liquidity. Artists do not create artworks by millions and buyers of original art are not nearly as numerous as stockholders. In 2013 there were at least 600,000 mid-to-high art

collectors in the world (less than 2% of all millionaires), with 36.5 million of transactions in arts and antiques and the volume of sales around $60 billion. See a sample of report.

It looks like art market is a more sensitive predictor of a coming economic bust than the leading stock market indexes. The Great Recession of 2008 was preceded by two years of stellar growth of art market. By 2015, we got the next boom. The stock market malaise of 2015-2016 is still in progress while I am writing these lines.

High priced art is from time to time bought by museums to make it public, presumably, forever. Thus, Amadeo Modigliani's *Nu Couché* (1917) was sold for $370 million in November, 2015, to the Long Museum in China, to make art accessible without going abroad, as the buyer, the founder of the museum, explained. "Forever" is another kind of nexistence, though.

Money and art are two endless topics, double endless (there are different kinds of infinity in mathematics) if talked over together.

To judge means to compare. The artistry could be evaluated by people familiar with large volumes of art accumulated over a long time, i.e., in historical perspective, against personal and public background of artist's life. This was first done on the grandest scale by Giorgio Vasari (1511 – 1574) who was himself an artist and architect. It remains the main approach of art description, with history of sales never out of sight.

The public seemed to be quite capable to appreciate art as a source of instinctively recognized beauty, which produced an effect close to physiological. This effect has always been my own yardstick for music, poetry, and movies.

I end this chaotic and exhausting, as anything about money, Chapter with the following comforting quotations from Vasari's Lives of the Artists about Raphael:

> [About the frescoes in the Raphael Rooms, Vatican Palace]. It is not possible to write of every detail in the works of this craftsman, wherein every least thing, although dumb, appears to have speech: save only of the bases executed below these pictures, with various figures of defenders and benefactors of the Church, and various terminal figures on either side of them, the whole being wrought in such a manner that everything reveals spirit, feeling, and thought, and with such a harmony and unity of colouring that nothing better can be conceived.
>
> And, indeed, among his extraordinary gifts, I perceive one of such value that I for my part am amazed at it, in that Heaven gave him the power to produce in our art an effect wholly contrary to the nature of us painters, which was that our craftsmen—I do not mean only the lesser, but also those whose humor it was to be great persons; and of this humor art creates a vast number—while working in company with Raffaello, felt themselves naturally united and in such accord, that all evil humours vanished at the sight of him, and every vile and base thought fell away from their minds.

4. ART AS REFORMATION

Something happened to European art between 1870 and 1970, give or take a few years. Let us tentatively call it the Transformation. I am sure there are dozens of theories about that, none of them simple, but I am looking for simplicity.

A big-picture way to see change is in terms of revolution—a historically fast transformation that destroys and replaces. It blocks the way back and even a counter-revolution cannot restore the past. Whatever had happened inside art—I mean, not caused by barbarians—it did not destroy anything.[20] The past remained opened to the public, treasured, cared for, and valued even more so as it was getting more distant. Art today is perfectly peaceful (reaction to art is a different matter) and inclusive to all its historical stages, styles, and inventions. Whatever monsters it creates today, they are tame and counterbalanced by the lush beauty living in the woods among dreams of good times. Art is capable of enviable acceptance and tolerance, which is its distinction from religion, but about that later.

Was art shaken up by a technological revolution around? The invention of photography and its world-shattering digitalization could have initiated a change similar to climate swings, gigantic volcano eruptions, tectonic shifts, or huge meteorites that used to re-direct evolution of species. But modern photography, as all technology, is not only reconciled with but welcomed and fully absorbed by art as just a technique. It has great achievements as independent form.

Thinking about the advent of modern art, by which I have been intrigued for a long time, I begin to understand the diversity of change as not only a succession of discrete states, like changing models on a runway, but continuous deformation in all dimensions, like a magical garment that **continuously and reversibly** changes its design, colors, and size. This is something that the

[20] Ai Weiwei's *Dropping a Han Dynasty Urn* could be an exception.

computers are so good at, but what is not supposed to happen in life goaded by entropy in one direction only, and by no means into a corral.



Ingres, *Comtesse d'Haussonville* (1845)

I wonder if a physicist could say that art is like an **ergodic system**, which can pass through all its possible states, wandering back, forth, and sideways, starting from any point.

What exactly happened in the Transformation? I wanted to understand it since my youth but while I wanted and waited, art was running ahead, its baffling annals swelling and bursting at seams. I finally got to them when they had become available on the Web. Here I am trying to explore art in terms more visual than verbal, with the help of art itself.

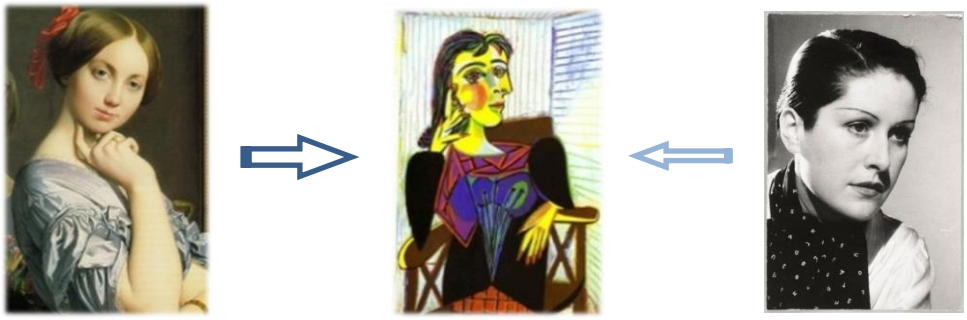


Figure 4.1. Modernization. Left to right: *Comtesse d'Haussonville* by Ingres (inverted fragment), *Portrait of Dora Maar* by Picasso, Self-photo of Dora Maar.

I start with Jean-Auguste-Dominique Ingres (1780 –1867). In my opinion, Ingres, whose ideal was Raphael, combines the photographic exactness of detail with airy transcendence and economy in portraying beauty. Too sweet for some tastes, Ingres, in my view, represents classical painting on the brink of reversed metamorphosis: from butterfly to caterpillar. I was only slightly surprised to find out that Picasso, Matisse, Degas, surrealists, and even the stark on the wall but loquacious on the floor Barnett Newman considered Ingres their predecessor. Turns out, Newman called Ingres "abstract painter," which is not the most extravagant of his opinions. They were typically even brasher than his paintings and certainly more entertaining.[21]



Ingres, *Grande Odalisque* (1814), Manet, *Olympia* (1863).

Comtesse d'Haussonville in **Figure 4.1** is a fragment of a **mirror image** of the original painting (1845). Ingres paints the young woman as if seen with misty eyes. It could be also taken for a lightly airbrushed photo for an advert and accused (not by me) of an enhancement or manipulation of reality.

[21] *Through the Louvre with Barnett Newman* by Pierre Schneider 1969 in Barnett Newman. Selected Writings and Interviews. University of California Press, 1990, p. 290.

Ingres believed that the most important thing in painting was drawing, i.e., shape, form, and lines. Nevertheless, his *Grand Odalisque* (1814) is, allegedly, anatomically incorrect.



Plain Tiger
(*Danaus chrysippus*)

Ingres followed his esthetic ideal. The reversal of the ideal of beauty was, I believe, an essential component of the Transformation under the slogan "back to caterpillar!" Not that I deny the beauty of caterpillars! But they just repeat the same segment many times, like the minimalist composer Philip Glass.

Édouard Manet (1832-1883) was at the very beginning of the Transformation. Curiously, it was his nude *Olympia* (1863) that heralded the new era with a thunder, but not because she was nude.[22] Olympia outraged the easily excitable Parisians (who had tormented even Ingres) by her "shameless" looking straight in the eyes of the beholder. *Odalisque* had been already accepted into the family by that time. Manet suffered from hostility almost all his life. *Critical* and *hypocritical* are just one hypo apart and today more than ever.

A character in Marcel Proust's in *Search of Lost Time*, where art is also one of the main characters, witnesses the process of posthumous public adaptation to Manet, apparently, around 1898:

> But anyway the other day I was with the Grand Duchess in the Louvre and we happened to pass Manet's *Olympia*. Nowadays nobody is in the least surprised by it. It looks just like an Ingres! (Marcel Proust, *The Guermantes Way*, translation by Moncrieff, Kilmartin, & Enright**,** *Modern Library, 1998*, p.716*)*

But *Olympia* does not look like an Ingres. It looks just like a Manet. The most persistent accusation against Manet's style was that his paintings were "unfinished." I trust first impressions. That was exactly where the Transformation started.

One of the most important results of the Transformation in art was the breakup of the connection between the object or model and its image and later even with any object at all. To put it differently, art was accepted as pure unconstrained creation, a piece of matter, thing, fetish, object in itself, token, article, caprice, joke, artist's logo, coat of arms, and a tangible investment—all defined solely by its place, purpose, and function and not content. Art became pure "self-expression," an enigmatic term that sounds to me as a circular expression of an expression. Or, is it a random act on a whim, like making a circle in the sand with a stick or hurling a rock into a shop window?

Art, in all its forms, stepped through the Transformation into the ambiguous area of performance in a crowded competition for a rank and reward, both measured in numbers. This does not look to me as unconstrained creation. It is more like business. Even if the reward is not an issue, the rank in a kind of artistic Forbes Index always is.

[22] *Édouard Manet: Rebel in a Frock Coat* by Beth Archer Brombert (Little, Brown and Company, 1996) is an account of Manet's life as a reluctant firebrand.

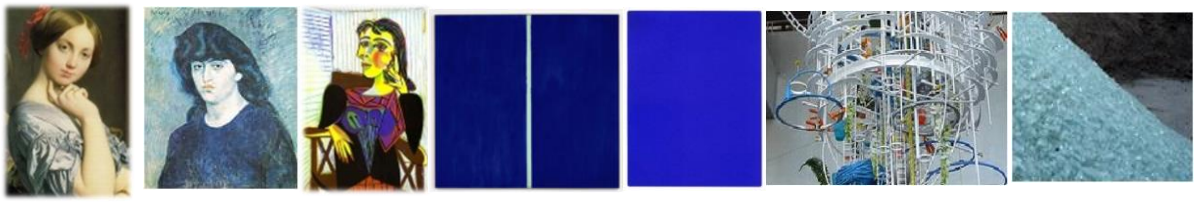
The arrows in **Figure 4.1** point to *Portrait of Dora Maar* (1937) by Pablo Picasso (1881–1973). The right arrow comes from the selfie of his model. There is nothing realistic about Picasso's image of the beautiful and passionate—in life and on her photo—woman. Still, if you see Picasso's painting, the photo, and the *Comtesse* side by side, not only some facial features of Dora Maar, but also the distilled and homogenized colors *à la* Ingres can be recognized on the picture by her deformer—in life and art—in which I see anything but love.[23] I feel like I've got really infected by artspeak.

Although the portrait of Dora Maar is not a quite typical for Picasso monstrous womanoid, the paintings in **Figure 4.1** exhibit the mystery of the Transformation better than any words: this is what happened with art, for better or worse, but why?

Revolution, mutation, innovation, liberation, reformation… I am looking for a better term and there is an array to choose from.

What happened is a much lesser mystery. It was dissolution of order, constraints, and rules without abolishing some fundamental orthodoxy of art rituals. If so, a more specific term looms as a competitor of Transformation: Reformation, *as if art were* a kind of religion. Is it? We will come to it later. "Reformation" lets you loosen your belt, pull out the tie, and unbutton the shirt, but the suit is still expected. Reformation of a particular kind, however, can also bite off a big chunk of your *joi de vivre*.

Reformation of art means looseness of order, canon, and constraint. It may lead to a greater variety and competition, encourage further evolution, and welcome freedom and equality. Reformation does not have a single human authority on earth, so that the followers of the creed can immediately begin splitting into fractions, each going to extreme in what Emile Durkheim, a theorist of religion, called *effervescence*.



1	2	3	4	5	6	7
1845	1904	1937	1953	1962	2005	2013

Figure 4.2. Reformation in blue: 1: Jean Auguste Dominique Ingres; 2 and 3: Pablo Picasso; 4: Barnett Newman; 5: Yves Klein; 6: Sarah Sze; 7: Lara Almarcegui (glass rubble).

I present two more illustrations of the Reformation.

[23] There is a remarkable in many ways website of Barbara Wells Sarudy devoted to history and evolution of pictures of women.

Figure 4.2 illustrates the process of transition from classical (Ingres) to modern art with artworks ordered chronologically. It leaves only one feature invariant in the series: blue or off-blue color.

The contrast between artwork on the left, right, and in the middle of the series is mystifying, but it can be rationalized.

I see in **Figure 4.2** the three dimensions of the art space:

(A) The scale from realism (1, 2) to deformation (3);

(B) The scale from nature (1-3) to artifice (6, 7);

(C) The scale from complexity (1-3, 6) to simplicity (4, 5, 7).

The contrast between simplicity and complexity is emphasized in **Figure 4.3.**

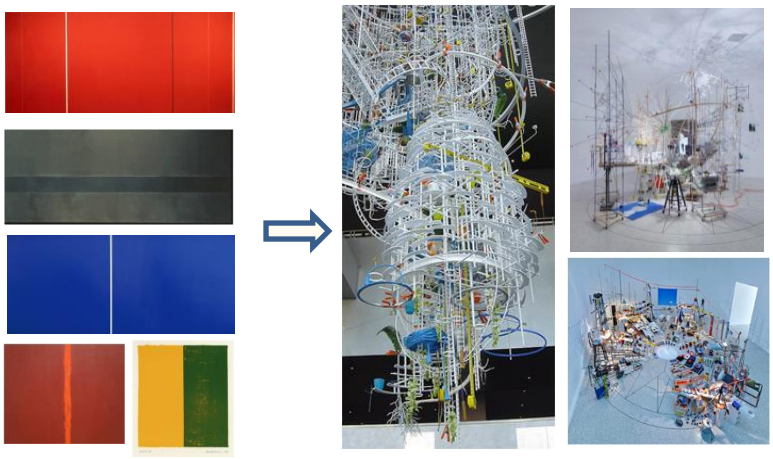


Figure 4.3. Minimalism and maximalism. Left: Barnett Newmann; right: Sarah Sze.

Once something new emerges, it evolves to its logical end until it loses vigor and becomes routine. On the scales of complexity, innovation, content, sense, size, realism, reference, chaos/order, palette, material, labor—everything goes to extremes because the extremes attract extreme attention and suggest extreme performance. Thus, one end of the scale of complexity harbors the stubborn minimalism: the distant pattern descendant of Manet's "unfinished" manner turned into mischievous laziness. It has its own extremists in monochrome painting. The other end is taken by maximalists exploring grandiosity (Christo and Jeanne-Claude) and number of **different** components (Sarah Sze). If components were the same, as in Ai Weiwei 's installations, I would call it malignant minimalism.

Entertainment is, probably, as old as culture itself. Human culture consists of two contradicting ingredients: routine and surprise. An inherent property of entertainment is its incessant novelty against the background of familiarity. Entertainment without novelty is a ritual. Ossification of novelty into ritual through imitation, self-imitation, and self-repetition, is a persistent trend of

modern art. If it is little noticed, it is because the enormous volume of art is dispersed all over continents, cities, and the Web.

The essence of the Reformation was recognition of art as visual entertainment, which automatically integrated it into business. The invisible hand of art market directs the show. That means anything but equality: it is growth, productivity, and competition.

Surprisingly, the kings of the art market offer not the most original but most mundane and universally **recognizable** creations. Those are flags, numbers, anatomical preparations, vacuum cleaners, photos of celebrities and grocery, polka dot patterns, kitsch, blots, and scrawls. This is a great paradox of modern art market, as if the invisible hand was guided by an invisible eye**.** I would call this effect "anchoring." It spares the viewer of pains of imagination—the prerogative of the artist.

Modern art tends to increase the base to keep the spire well above the artistic masses yearning to breathe free . In this market, the productive simplicity has an upper hand over complexity of concept and form. The minimalist can simulate ingenuity by multiplying **identical** components (the caterpillarization) and oversizing a simple singular segment. "More, More, More," the market roars.

I have no proof of what I am saying. Consider it a hypothesis. It could be researched and tested.

Art is what is called, displayed, exhibited, bought, and sold as art. I am not yet tired of repeating this. It is the institution and environment of art that makes a thing a piece of art, not its appearance, private opinion, decree, or face-to-face deal.

This circularity ("a rose is a rose is a rose") applies to all subdivisions, forms, movements, genres, and styles of modern art. Thus, painting is what has a frame or clear borders, not necessarily rectangular (as in paintings of Ellsworth Kelly, Alan Charlton, Frank Stella), flat, or even 2D. Painting is what is called painting.

The Reformation absolved all previous artistic sins and turned them into virtues.

Transformation is an essential element of the Reformation. Next, let us look closer at the intimate details of transformation in art. How one **style** morphs into another? What are the innermost steps of that process?

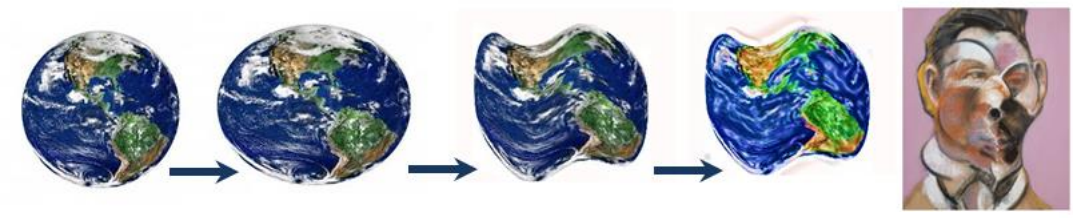


Figure 4.4 Deformation as creative pattern. Far right: Francis Bacon (1909 – 1992), one of *Three Studies of George Dyer* (1969) .

There have been two major pattern ways to produce a modern mainstream artwork: deformation, **Figure 4.4**, and recombination, **Figure 4.5**. **Figure 4.4** starts with the picture of the globe and drags it through a sequence of Procrustean deformations of stretching, warping, and color change. Francis Bacon's painting leaves the haircut of George Dyer (1934 –1971; a few photos can be found on the Web) as probably the only recognizable feature of the model, but the rest is heavily deformed. Deformation is a canonical practice of modern art styles that preserve some ties to reality.

The abstract picture of Joan Miró *The Smile of a Tear* can be **imagined** as produced from the picture of the globe by color analysis and creating the palette of basic colors and recombined as a new picture, which has nothing in common with the globe except the hint to a blue liquid (**Figure 4.5)**. In this way, any picture, whether abstract or not, can be transformed into any other. With a minimum requirements, constrains, rules, and references to something else, all art is accommodated by a single abstract **art space**. The pattern of form is preserved while the pattern of content is absent except as a hint.

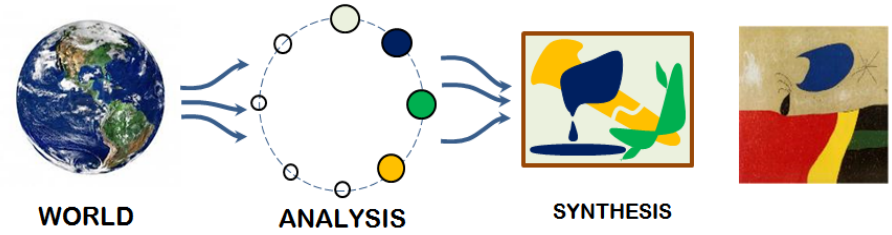
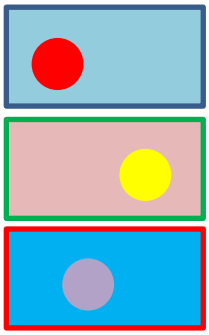


Figure 4.5. Analysis, recombination, and synthesis. Far right: Joan Miró (1893 – 1983), *The smile of a tear* (1973).

The modern artist paints not an object but a choice of rules, preferences, urges, and allusions characterized as style. He opens his bleeding heart to a consilium of shrinks. It looks like confession, but is it honest? We will come to it in ART AS BELIEF.

Deformation is irreversible in the sense that the artist can always deform a model image in thousands of ways, but the viewer cannot reconstruct the model from its deformation, unless there is an independent source. People in cartoons are recognizable if they are widely known and the artist controls and restrains deformations.



Artistic degeneracy

Recombinant art is prone to a sinister, in connection with art, phenomenon that is kosher in various fields of science: *degeneracy*. Although the corresponding adjective is *degenerate*, it is not the same as in "*degenerate art"* (*der entartete Kunst* in German) and there is no need to ward off Hitler's ghost. Degeneracy (not degeneration) in mathematics and physics means, very roughly, the situation when several mathematical objects or physical states are different, but have the same key property, for example, energy. A simple analogy is all "degenerate" combinations of various coins that have the same total $1 value. Thus, to my artistic taste, all color combinations of rectangular bordered field with a circular spot in it have the same artistic value: they are degenerate variations. I know, artists will never agree. Sorry, folks, in my *entartete* eyes degenerate art exists. Don't look me straight in the eyes, however.

I believe that recombination is a degraded creativity.[24] Moreover, all spirals and scribbles and (I expect a lightening to struck me next moment) even all Mondrians are more or less the same for me. (It didn't! How's that?). But I also admit that in the eyes of an art collector they could be as different as Chevrolet and Maserati for a car buff. This is the moment when art tells me something about myself. What is it?[25]

[24] My old manuscript *The New and the Different* is related to this problem. Each historically "new" circle in a rectangle is different, but not new. By the way, "degraded" is also a physical term applied to energy. The latter is, of course, a term of artspeak and artistic biographies.

[25] I am overly prone to generalization. I need to be degeneralized. Or degeneratize? Degener… what a nasty word! I am too irritable, demanding, narrow-minded, and intolerant.

5. ART AS STONE

I continue the confessional footnote 25 of the previous Chapter. I am not a believer by nature or practice. I am too introverted, reclusive, and padlocked. I am too rational. I want art to "change my life," using the popular, on par with "disruptive," modern cliché, but only for a moment. Otherwise, all I want from life is to let me be myself.

In this Chapter, I compare three modern artists who have unlocked some vaults in the basement of my mind. They are formally united with the theme of stone, as well as with my instinctive attraction to their work. All three of them are women. Their styles divulge some aggressiveness, but I am reluctant to resist it.

When in 2013 I was making my first steps into postmodern art, two names drew my attention: Sarah Sze, the mute Siren who was the first to lure me into modern art with her cryptic visual gestures, and Lara Almarcegui who initially seemed to exemplify with her giant piles of construction debris all that is forbidding in art. It took me almost two years to bump into Cornelia Parker, thanks to BBC, which shows how big but insular modern art is and how much study one needs to become its educated devotee, which I am far from being one.

Sarah Sze is well represented on the Web. There was a story about her boulders in *New York Times.* They are but a small part of the enormous *Triple Point* exhibition covering, unbelievably, the entire Venice. The boulders are made of an aluminum skeleton pasted over with photos of real boulders. The artist was said to be giving away some boulders to Venice residents to put on balconies and windowsills.

My googling for the rest of Sarah Sze's creative work revealed a great diversity of her art, unexpected and surprising even after the *Triple Point*. She is an orchestral Mahler-type maximalist, but there are also quartets and solos in her chamber pieces. Diversity, variety, complexity—such qualities seduce me easily. I feel myself a kid in a toy store. Do I begin to sound like Vasari about Raphael?



Sarah Sze. Small part of exhibition at the USA Pavilion at Venice Biennale, 2013. Photos: Darren Milligan & Brad Ireland, Flickr and DOMUSWEB. See also **Figure 4.3**.

My initial reaction (close to "it can't be!!") was a consequence of my prejudice and ignorance regarding modern art, but it did not last a day. I felt instinctively attracted to the exuberant complexity, childish playfulness, and sense of humor of the artist. I suspect even some self-irony. Today, three years later, I understand that Sarah Sze's flea market art resonated with my personal life long obsession with Everything and what unifies the natures of Things and humans, as well as what makes them different. I was captivated, intrigued, and drawn to something I had missed in visual art. There was also my instinct of a chemist. I projected on the artwork my own pattern-chemical ideas. There was some rapport between my life and the eccentric creations looking at me from the computer monitor. I have never met them face to face. [26]

Then I ran into the intimidating and not less eccentric burial mounds of Lara Almarcegui, Sarah Sze's Spanish mate at the Venetian Biennale of 2013. What a contrast!

> Jean-Pierre Dalbéra, a contributor of great photos of art on Flickr, noted on Spanish Pavilion: "The pavilion is filled with a huge pile of rubble which leaves visitors perplexed and perhaps evokes the social and economic situation of Spain today."

This time I did not trust my first impression. After some research, I found out that Lara Almarcegui was interested, quite like a biologist, in the life of the cities, their youth and decay, anatomy and physiology. She "deconstructed" buildings into their primary materials and exhibited their components as piles of stone, concrete, glass, etc., the size of which preserved the ratios of the quantitative composition. That was, in my eyes, pure analytical chemistry. From this angle, the constructs of Sarah Sze now looked like molecular models of Everything. Lara's exhibition at Venice Biennale, 2013 was a decomposition of the same pavilion in which it was located. There is her video presentation of the project.

[26] The US exhibition at next Venetian Biennale of 2015 (artist Joan Jonas) and Sarah Sze's garden of the *Secret Installation* at a separate place look on the Web trivial, second hand, contrived, and tired. Sarah Sze even crudely imitated Cornelia Parker's hanging bricks, see next page. But it all should be seen live.

In my eyes, the monoculture art of Lara Almarcegui detracts from artistry but compensates for that with rationality. If abstraction is beautiful anywhere, it is not in art but in science. I can only hail such intellectual leaps. They attract me immensely. I happily surrendered to the rocky charms of the second Siren.



Figure 5.1. Lara Almarcegui. 1. Spanish Pavilion at Venice Biennale 2013; 2: Part of its deconstruction (with detail insert); 3, 4: Messe Basel Exhibition Center; 5: Its deconstruction list; 6: Exhibition at Vienna's Secession, 2010.

Truly, complexity is my catnip. Cornelia Parker's contribution to my collection of stone art was hovering between the floor and the ceiling. It was aptly entitled *Neither From nor Towards.* The stones, suspended on thin wires from a framework under the ceiling, were bricks from houses that had fell over years from eroding cliffs in Dover. They were worn smooth by the tide.

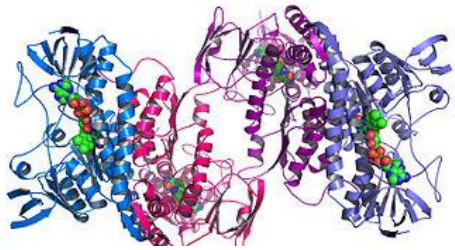


Figure 5.2. Cornelia Parker, *Neither From Nor Towards* (1992). Photos: Matt Kieffer . See also photos by Patricia Rogers.

The wire suspension has been used by the artist on a great variety of things, among them brass musical instruments and silverware cruelly flattened by a steamroller. Self-repetition is a most common side effect of artistic success and, evidently, sometimes its source and necessity. Cornelia Parker is both young enough and famous and her current projects are completely and irresistibly crazy and are "bad in a good way," borrowing the expression from artspeak.

What can the three Sirens tell the chemist who, like a frog, inhabits both parched science and swampy arts?

Sarah Sze is about connectivity, which is the very core of chemistry, music, and poetry. A structure of a complex enzyme is a finished picture (it is actually, a ready 3D installation) of what complexity is: a hierarchy of selectively interconnected units. A biopolymer is a mostly dull linear sequence the beauty trick of which is elaborate and fragile folding. Can anything in civilization have this kind of structure? A narrative, a text of a novel, a book of ideas, and a computer code come to mind. The best public speeches of Barack Obama remind of the same pattern.



The structure of dehydrogenase from *Colwellia psychrerythraea* (Wikipedia)

Lara Almarcegui is an analyst and a maximinimalist. Her piles consist of almost identical "atoms." She commands tons of solid stuff to sit in place for a short time of the exhibition. Her heavyweight art, paradoxically, both monumental, and ephemeral, is also brave and thoughtful, but it sits on the very borderline of complexity.

Cornelia Parker is quite capable of explosion, but not that of complexity. She captures in her suspended animation the fleeting moment of transformation, the "transition state," which is the main concept of chemistry of molecules and patterns. It separates initial (*From*) and final (*Toward*) stable states and is the key concept is to understanding the process of transformation of *Now* into *Next*. To my ears, however, the gagged screech of the tortured musical instruments drowns out the song of the Siren. I don't like mass murder of Things, not to mention people and animals.



Cornelia Parker at Whitworth Gallery, 2015.
Photo: Damian Entwistle

Cornelia Parker is drawn to destruction. She is about connectivity, too, but in an ambiguous way. She said in an interview : (2009): "I first started making wire **drawings** from melted-down objects because the process of making wire is called "**drawing**." She connects words, ideas, and matter. Tilda Swinton sleeping at MoMA in her performance *The Maybe* (ART AS MATTER) is another example of Cornelia Parker's convoluted associations.

The topology of Parker's inventions is unbound. Her connectivity has intergalactic range. But self-repetition begins to stick out. Why not to establish something like patent system in the modern art in order to boost sinking creativity? Thou shalt not steal, even from yourself.

There is another common theme in the three songs of stone, as I hear it. They are about off-picture humans in their by far outliving them but still mortal dwellings with their walls, foundations, naturally scattered around detritus of daily existence, and the gentle *memento mori* for which stone is used since time immemorial. (Ha! I am really under the spell of the Sirens)

The stones of the three artists—one fake, the other real, the third dead—again tell me something about myself—the subject I will return to in ART AS MIRROR , which is also about stone, in a way.



Raphael, *The Fire in Borgo*.

I am intrigued by rational aspects and implications of modern art. I appreciate novelty, inventiveness, and originality. I like the play of ideas. This is what attracts me in science. But it is not comparable with the physiological effect that music, poetry, or film and literature can have on me. In my exploration of modern art, I am driven by intellectual motives: I want to understand its origin and message. Yet the conception, gestation, and birth of art are still mostly old-fashionably human. The artist as the behind-the-scene creator or self-performer is for me the main component of modern art, not the shark, balloon dog, or even self-portrait.

The modern—and now even classical—art as a whole entertains me but rarely excites. Looking at the Raphael's The *Fire in Borgo*, I cannot share the exaltation of Vasari regarding this fresco (see the conclusion of ART AS MONEY). I have the same problem with most of Mozart.

I discern a difference between artistry and artifice. Artifice is about *what* and artistry is about *how*. Anything repetitive is artifice and everything unique is artistry. Nothing is more exciting than uniqueness and the unique evidence of a uniquely talented human.

Music and text are cardinally different from visual art. They blind out the powerful distraction of vision: that big, greedy, and egotistic part of our animal design. Text and sound are not real in the same way image is. They need a preparation, training, or gift to understand complicated music and poetry and untangle their complexity. To understand and love Rilke or Bartok is an art in itself, like the art of human relations and love.

Knowing modern art mostly by reproductions and photos, I find it preposterous, frivolous, and boring. But the more I see and the less I read about it, the more tolerant I become: tolerance comes with knowledge. Then sympathy, longing, and quiet joy of recognition might follow, like the relations with a few people to whom we feel attraction and sympathy. Our favorite artwork starts an independent life in... in… but where? It is hard to find a name for the place. Let us still reserve for arts our belief in however nexistent soul.

Somebody who stays in contact with large quantities of art, as either fan or professional, can easily acquire the same fine selective taste to it as a wine aficionado. As I said, my access to visual art was very limited for most of my life. Access to music, poetry, and literature was much wider. But in any case, the greatest market icons do not cease to repel me with a glaring absence of artistry. As Sarah Thornton put it, "an actor playing the role of artist."

Striving for objectivity, I admit that, having been suddenly transferred from Soviet Russia to America over 50 missed years of world history, I could be too conservative and pre-modern to understand the spirit of postmodernity.



Figure 5.3. Stone, canvas, and air. Left to right: Natural stone Travertino Rosso Persiano; Barnett Newman's paintings *Anna's Light* (1968), and Hurricane Patricia over Mexico, October 23, 2015, satellite (NOAA).

Figure 5.3 is just my accidental association *à la* Cornelia Parker on the theme of stone, air (its extreme opposite), and the nature of abstract art. Consider it my own derivative art, for a moment.

> Hey, aren't the vertical zips of Barnett Newman of the same blood as the wires of the stone hangers?

Art is intoxicating or, in Nietzschean artspeak, Dionysian. Here is an insightful observation that I want to quote as a prelude to ART AS FUTURE:

> This desire to make art more about experience rather than meaning makes me wonder, if modern art is supposed to be a reflection of our modern times, are we approaching a more Dionysian era in society? Is our long grown belief of Apollonian decaying to give way once again to a Dionysian way of living?

I think so. The author is Ian Heckman in his blog "Roots half-hidden" .[27]

[27] In his new artistically excellent book *Fracture : life and culture in the west, 1918-193*8 (Basic Books, 2015), Philipp Blom seems to associate the two world wars with the preceding hedonistic (what I would call Dionysian) culture after WW1. I believe we (or at least 1%) are still deep in another Dionysian phase, inciting comparisons.

6. ART AS ABSTRACTION

The advent of abstraction looks like the sharpest turn in the entire history of art. It came like a thunderbolt or wildfire—the common metaphors of artspeak. Like automobile, which left space for horses, or cinematograph, which left time for theater, it spared classical art. I hesitate to compare it with the onslaught of computers, however, until I am quite certain that they will be as merciful as art is.

Abstraction is typically defined in a negative way as "turning away" from creating **recognizable**, even if simplified, schematic, mutilated and twisted, images of real world. Other definitions sound positive, like "a visual language of shape, form, color, and line" (Wiki). The metaphor of language fits any art and science, if not everything humans do, like "language of sex" (Google: About 327,000 results, 0.26 seconds) and "language of food" (about 13,000,000 results, 0.31 sec.), but the abstract "language" has no common grammar: a mere vocabulary to which the artists apply their personal grammars. Some more cautious definitions realize that abstract, modern, classical, and any other art cover a continuum. If so, definitions lose any utility and the revolutionary effervescence fizzles.

Yet the change of the art landscape has been apocalyptic. It is as if the earth suddenly filled up with all creatures of the past and present, as well as their fragments and crossbred chimeras, suggesting an act of Invisible Hand.



Language is impossible without despotic **constraints** of grammar. Abstraction outside art is a process of formulating a single rule for a set of concrete cases, which usually reserves a place for yet unknown cases. It names many things with one name—exactly what mathematics is about. The grammar is possible because reality—and even dreams—is not completely chaotic but



ordered by strong **constraints**. Thus, an animal cannot be in two separate places at the same time and a river keeps flowing although it is invisible behind a tree.

Although scientific, philosophical and, actually, any idea is always abstract, while observable reality is always concrete, an artwork is never completely abstract for two reasons. The factual content of artwork is largely consensual: "taking Jesus down from the cross," "color dots on white background," "a pile of candies," "red squiggles," "chaotic color zones." The impact on a viewer, on the contrary, is subjective. If it is widely similar over large groups of viewers of classical art on Biblical themes, it is under the powerful **constraint** of its textual source, even if it yields to the irreverent spirit of modernity.

I understand art as a whole in terms of combinatorial configurations, which means that there are distinct components selected and connected (arranged) in a particular way. I do not think it is much different from the way Kandinsky saw it. Art is a giant salad bar of ingredients with a stack of small plates, such as a place on the wall, floor, ground, or levitation in the air. The difference between classical and modern art is that the former has constraints imposed by the object, and the latter is constrained by the personality of the artists and the extent of his borrowings from others. Deformation and recombination bridge one with the other.

I bet we can repaint any classical painting, like Velazquez' *Las Meninas*, while slightly proportionally resizing figures and reshuffling the composition, like moving the dog to the left, and some viewers would not notice the difference. It will be recognized as Velazquez or at least a perfectly classical realistic painting. Classical art preserves large blocks of reality, as if rearranging the same furniture in the room and from time to time replacing the pieces.



Diego Velazquez (1599-1660), Left: *Las Meninas;* Right: It is still Velazquez, isn't it?

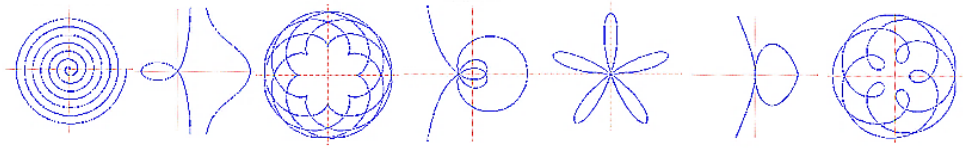
Straight line, curve, polygon, grid, circle, and square, not to mention Platonic solids, are well recognizable objects for somebody with appropriate professional background. So are arbitrary and chaotic squiggle, blot, smudge, curve, and blob.

If we **recognize** a forged cubist portrait by Picasso as … a cubist portrait by Picasso, it means that we recognize art of Picasso as a natural phenomenon. This is what the cliché "art enriches the world" means.

What makes art "abstract" is the whole image that we perceive but cannot **anchor** it in our experience because we have a different experience or none at all. Instead, we compose an associative narrative from our impressions. Unlike the artwork, it is really abstract because it exists only in our mind, as any idea. Or we can listen to artspeak instead and decide whether we trust the artspeaker as much as we trust, for example, a mathematician.

Mathematicians[28] work with a big zoo of forms and they have a refined taxonomy of their darlings. Unlike paleontologists, they have no problem with reconstruction of their origins.

Mathematics has its own abstract celebrities. They are as famous, in a way, as Warhol's *Marilyn Monroe*, although less than the actress herself. See Famous Curves Index. Here is a small selection.



Famous curves. Left to right: Spiral of Archimedes, Conchoid, Epicycloid, Plateau Curves, Rhodonea Curves, Pearls of Sluze, and Epitrochoid

Each curve is a plot of a mathematical function. It is abstract in the mathematical sense, i.e., one standing for many, because there are infinite numbers of Spirals of Archimedes, all described by the same simple equation $r = a\theta$ (in radial coordinates) with different parameters a.

There is a similarity between even most chaotic abstract art and slender visualizations of mathematical objects. They both can be represented by a set of instructions applicable to an indefinite number of images. Thus, there are websites that instruct amateurs how to paint abstract pictures, for example, *5 Easy Ways to Create an Abstract Painting*.

Mathematical regularity became a source of Op Art , which presents carefully controlled order and chaos in various proportions. Computer art is its next logical expansion and it generates images of exquisite beauty and wild intensity (**Figure 7.1**), which may suggest that regularity is the essence of beauty. Symmetry is an example of regularity. Robotic painting is the natural next step. Can the 19th century shock of photography repeat itself in history of visual art as digital shock? Well into the new era, nobody has been shocked yet. Art has a big heart.



Bridget Riley (b.1931), *Arrest 1* (1965)

Kandinsky's *Line and Point* Manifesto looks to me, with hindsight, as a prophesy of the Digital Era. Art is prophetic in a self-fulfilling way. Abstract art is the ideal task for computer with its unlimited imagination, ability produce chaos[29] and harsh order in any proportions, and its lack of any constraints whatsoever. The machine does not care about the real

[28] Relation between mathematics and art is widely represented on the Web.

[29] There is no algorithm for pure randomness and computers use it various surrogates. The pseudorandom number can be unpredictable and cryptographically secure, but randomness and algorithm are incompatible notions.

world populated with humans, and would not give a dam for the entire universe. The dimwitted humans, with their narrow-minded algorithms of instincts, their quirks, sensibilities, and prejudices, are nothing but impediment for the unbound computer creativity that only another computer can fully appreciate.

Being one of them humans, I kind of like our breed. Humans have an insatiable curiosity toward themselves and their companions. They also have an inborn but not uniform sense of beauty. I believe—no, I hope—that the future belongs to some kind of post-abstract art with a human shadow, if not human face. Not forever, of course, only before the pattern pendulum plunges into the next of its two swings. A small perk of being mortal is that we do not need to care about anything for too long.

At least put your photo on the back of the canvas, painters!

The phenomenon of **anchoring**, the visible or, mostly, hidden instinctive and subconscious gravitation of abstract art toward real world, which I have discovered, to my surprise, during my years of pilgrimage from Sarah Sze to Cy Twombly, makes me, uncharacteristically for my personality, elated. I can even go further into generalization: **nothing material can be abstract in any sense because of its thingishness.** The Thing is always concrete. I have my way of going to extremes.

Artwork, as I said, is not a Thing because it is unique and not mass-produced. Yet the gloomy maniacal self-similarity and self-repetition of some modern artists puts art right on the Thing's side of the border between Thing and thing.

There are two opposites of the term *abstract* if applied to art: concrete (factual) and real (physical). The painting is always both concrete and real, as any piece of matter. It is its meaning that can be recognized or not, and realistic for one person while abstract for another. Arts, whether classical or modern, are vast expansions of Rorschach blots.

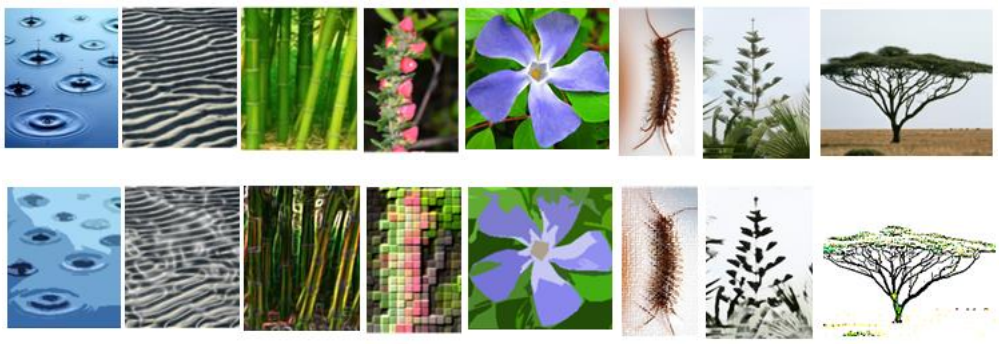


Figure 6.1. Top row: Regularity in patterns of nature. Similar combinations of similar elements. Bottom row: the same with artistic effects of Microsoft Word.

Nature is a rich source of repetitive visual properties that can be generalized over particular cases. Simplification makes them look like abstract art.

Looking at **Figure 6.1**, I begin to think that the main property of abstract art, from its birth to current over-the-hill age, is simplification. Edouard Manet seems to be the true founder of abstract art, although I still do not know what was driving his hand, because he did not associate himself with the new wave.

What is simplification? In art, it is just minimalism, pretense, affront. In science, it is the essence of understanding. In politics, demagoguery. In philosophy, extinct. In modern life, forget about it.

I begin to think that the genre of drawing and the technique of print, which employed simplification by necessity, were among the genes of the classical art that had become dominant in modern art from the very beginning. But the primary reason for that still evades me. If I am right, modern art was a mutation developed and socially justified as Reformation. Didn't the religious Reformation start as a mutation in the mind of Martin Luther? By the logic of Daniel Kahneman, it could be classified as fallacy. For more about that, see my **Essay 58: Pattern Chemistry of Rationality: All rational minds are alike; each irrational mind is rational in its own way.** Its long subtitle is all that relevant.

I have already mentioned complexity over 20 times in this Essay. It is time to inquire what the term means.

Simplicity and complexity sound like two opposites, but they are parts of the same scale ranging from zero to indefinitely large values. This is why I think that there is only one parameter, complexity, and simplicity is just low complexity. It is difficult to say how high complexity of something is because different people and different professions may easily disagree.

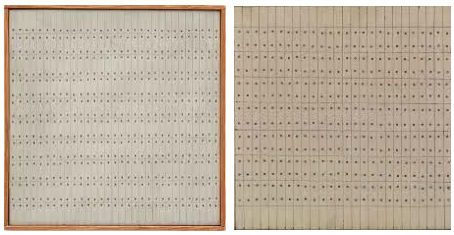
I do not believe in infinity, but I am certain that complexity is a crucial, although neglected and little explored parameter of any aspect of our civilization and human matters in general. For example, we could be interested in the size of a potential enemy's army and its armaments, have our triple numerical advantage, but if the enemy's organization and decision making is three times simpler than ours, we probably have three times less chances to win. The numbers are wild guess, but the bleak history of long American wars could have a truly simple explanation: complexity of political system. Not accidentally, the Civil War (1861 – 1865) was one of the shortest: the complexity difference between the sides was minimal.

There is the concept of Kolmogorov complexity in mathematics: object ***A*** is more complex than object ***B*** if its **shortest** full description is **longer** than that of the other. It sounds like oxymoron, but I really cannot go here into details because of the lack of consensus and my own qualifications. Strictly speaking, this concept is applicable to strings of symbols in computation, where meaning of all symbols and words is well defined.

> I think that there are problems in science that can be treated only with the inclusion of human presence and subjectivity into the picture. Anthropic principle in cosmology is an unsettling example. Pattern Theory and theories of complexity belong to this type, too. Probably, science needs a marginal Reformation: including human choice into the subject. Thus, Pattern Theory requires a subjective choice of its basic terms, but no

matter how exactly, unlike in cosmology. It is like choosing which of the green beans on your plate to start with.

I will jump to conclusion in the form of an example. A change in a realistic painting is recognizable and it can change artistic values of the artwork because the shortest description is really short. The shortness comes from using large blocks of recognizable information coded by short phrases, like "the return of the prodigal son" or "battle of Waterloo." Since abstract art is not recognizable, its description can be long, but most of it is artistically irrelevant. It will be noticed if the artist misses an apostle in a "Last Supper," but the existing difference between Agnes Martin's *Untitled* (1962) and *Little Sister* (1962) is not easy to notice, at least online and ignoring the frame.

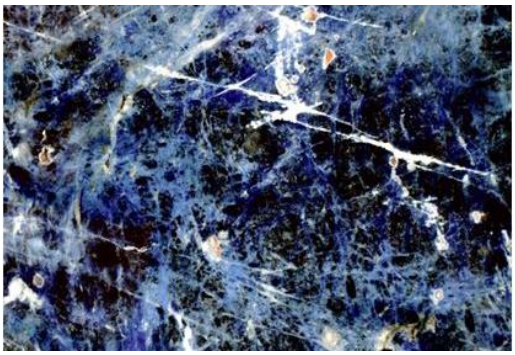


Agnes Martin, Untitled (1962) and Little Sister (1962)

Does the frame matter? The comments to *Little Sister* (1962) are eye-opening.



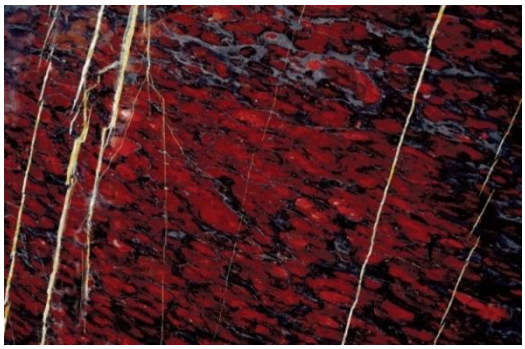
Jackson Pollock, *Number 8* (fragment)



Lapis blue granite



Jackson Pollock, *Lucifer* (fragment)



Rouge de Roi (Rouge Antique) marble

Figure 6.2. Are the processes in the depths of the earth and the brain similar? They probably are.

This example illustrates the difficulty of defining complexity because Agnes Martin is **evidently** simple and Leonardo da Vinci is **evidently** more complex. If we notice that Martin repeats the same element many times, Kolmogorov's definition looks valid, at least for modern art. This is why minimalists add intriguing but totally unrelated titles or scribbles to beef up the meager complexity. Damien Hirst seems to have all the beef in the world, but he still entitles his **shark in formaldehyde,** which is the exact description, *The Physical Impossibility of Death in the*

Mind of Someone Living. Well, I am just mean with minimalists. Verily, art is one's mirror. But aren't they mean with art?

While regularity and repetition can be seen in nature, imperfection (variability, deviation from the mean) is the main sign of natural origin. "Imperfection" should be the very essence of art that has no norm and no rules, but, curiously, even such art has an unstoppable drive toward draping itself into a flag of some style, school, or platform.

But at least Jackson Pollock is anything but simple, isn't he?

Are Pollock's paintings realistic in view of their similarity to natural stones? I do not know how to answer this except by admitting "accidental realism." I see in them a **pattern** of partially ordered natural process. I also suspect that the use of textured marble, granite, and malachite for internal decoration responds to the same human attraction to ordered chaos that was met by Jackson Pollock the pioneer and by his epigones. What is undeniable, they evoke an emotional response. Clouds and stones do that as well. Pollock's beauty is richer because it is more complex, even though it uses the same pattern all over the canvas.



Figure 6.3. Natural (not man-designed) objects. Top: Man-assisted Rorschach inkblots. Middle: Celestial objects. Left to right: Helix, Horsehead, and Great Carina Nebulae (NASA photos). Bottom: Clouds.

The most common distinction of natural objects is that they lack the strict regularity of geometrical forms. For example, they do not have perfectly straight lines, curves along simple mathematical functions, and exact symmetry. Even the flowers described by botanists by "floral formulas" are unpredictable in their details and even snowflakes are never perfect. The Rorschach blots, although tainted by artificiality because they are symmetrical, are still hardly predictable. As for clouds and nebulas, **Figure 6.3**, they are, appropriate to say, God's blots to

test our personalities: are we capable of feeling beauty and awe of the world around us? I am feigning sentimentality.



Sigmar Polke Untitled (Rorschach), 1999.

The blots are man-made but not man-designed. Their shape, however restrained by symmetry, is to a significant degree random. They can be manipulated up to a point by preparing the original splash of ink before pressing both halves of the sheet together. Sigmar Polke, an adventurer and explorer (the party for which I will always vote in arts), did that in his experiments with Rorschach blots. What bars the nebulae and clouds from entry into an abstract art gallery is our knowledge of their non-human origin. However weird the shapes of most nebulae are, they cannot be arbitrary: order is present there, too.

The shapes of blots in our hands, nebulae in deep space, and clouds over the earth have some constraints. Constraints mean order. What is the source of order?

Words like natural, unplanned, and, especially, in this context, random invite a long and difficult discussion, but I, in a Zen-like manner, will simply show what I mean.

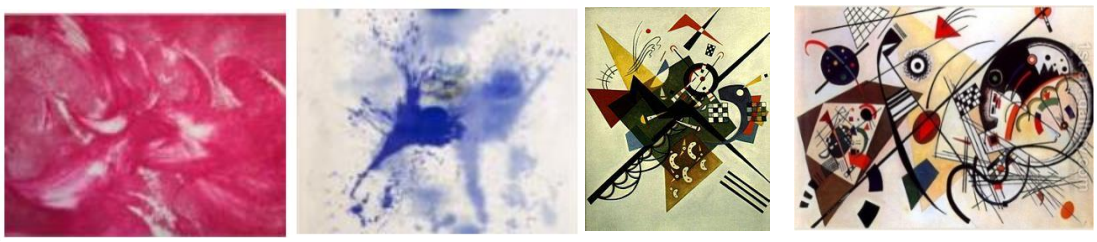


Figure 6.4. Quasi-nature and pseudo-Things
Left to right: Jean Messagier (1920-1999), *Apocalypse du printemps* ; Hans Hoffman (1880-1966) *Astral Nebula;* Wassily Kandinsky (1866-1944), *On White 2* and *Transverse Line*, both 1923.

In **Figure 6.4**, two left abstract nebulous pictures deliberately imitate nature, as their titles reveal. The two pictures of Wassily Kandingsky, on the right, although nebulously entitled, exemplify human artifice: straight line, smooth regular curves, and color fields within sharp borders. Somebody (myself, at least) can easily imagine the paintings as two-dimensional projections of arrays of strange but certainly man-made 3D objects piled up or spilled out on a flea market tarp. From this kind of painting a modern installation emerges, a curious hybrid of painting and sculpture, hauntingly realistic, sufficiently chaotic, and utterly irrational. With a live human as a component, sprinkled with theatre, it becomes performance art. But I have already written about that in ART AS MATTER.

I am coming back to **anchoring**. This happens when reality is unreal, too.

Figure 6.5 shows a brightened and sharpened up fragment of Andrea Mantegna's (1431-1506) *Agony in the Garden* side by side with the painting itself. I can recognize neither of them as realism. Is it because the content of the painting is mystical?



Figure 6.5. Is it realistic art? A brightened-up fragment (left) of *Agony in the Garden* (1453-1454) by Andrea Mantegna (right).

Mantegna's other paintings and frescoes often look like photos of sculpture or cardboard cutouts, which only elevates him among the old masters in the eyes of the modern ones. It looks like a modernist re-painting of a classical painting.

For a comparison, look at **Figure 6.6** that also represents the unreal.

The paintings in **Figure 6.6** depict scenes not only never observed but, from a rational point of view, as non-existent as Goya's monsters. Yet the images are realistic, even naturalistic, like a touched-up photo. In the painting of William-Adolph Bouguereau (1825-1905), the dead woman and the angels look like vigorous healthy humans. The wings of angels could be borrowed from a Victoria's Secret lingerie run. In Corrado Giaquinto's (1703 – 1765) painting of Heaven, Satan, wearing his little Halloween horns, is kneeling on a soft feather bed and looks as comfortable as everybody else in the company.



Figure 6.6. Super-realism or full-blooded nexistence?
Left to right: Corrado Giaquinto, *Satan before the Lord* (1750); William-Adolph Bouguereau. *Soul Carried to Heaven*, (1878); Bouguereau, *Dante and Virgil in Hell* (1850); Real fake wings and horns.

Bouguereau is so bound by reality that that he betrays Dante. He paints an episode from Dante's *Hell* ("one came to Capocchio, and fixed his tusks in his neck," *Canti XXIX- XXX*) as a clutch of two healthy athletic bodies, but both sinners, Capocchio and Gianni Schicchi, the attacker, are supposed to be ill and covered by itching scabs "from head to foot."

The mythical imaginary world, never observable and scantly described in texts and legends, can be painted realistically, but it means abstraction from all its otherworldly properties that we believe in.

Only up to my knees deep in modern art, I began, surprisingly, to see less contrast between classical and modern, concrete and abstract, real and surreal. The perceptions of the same art by its contemporaries and later generation cannot be the same against different backgrounds of the past. This is why modernists discovered their predecessors in classics, as the trees of art in ART AS TREE will testify. After my further wandering in modern art, some classical artists, whom I always considered paragons of realism, suddenly began to reveal to me the blotches of coming avantgardosis. I was like a medical student who finds in himself symptoms of the disease he studies.

Is modernity modern? Is abstraction abstract? What is the difference between classical and modern art? I wonder if anybody has ever tried to analyze visual art from the position of structuralism, as it has been attempted in literature. Literature cannot be reduced to pixels, but image can. It means that art could be analyzed as it is, as an image without opinions, meanings, interpretations, background, mythology, and artspeak: just a matrix of pixels.

I know that literary styles could be computer-imitated. I do not know where it would bring us with art. I am just curious. Here is a link , which is a look into the future of art. It is also the present of the art of modern CGI-boosted cinema.

Visual arts, beware computers: it is the second coming of photography. Will artists betray Kandinsky? Maybe. Warhol? Never.

Amazing…

7. ART AS TREE

Abstraction is the staple and the jewel of both art and mathematics. They are made for each other and they share the crown of imagination. Sometimes they even meet at an art gallery.




Figure 7.1. Left: Fractal art of Jock Cooper, image 1008111; right: Henri Rousseau, *The Equatorial Jungle* (1909)

Art is as concrete as matter can be even if it is abstract art. You can knock on it with your knuckles. What happens if we look at art in abstract way and try to paint the abstract picture of abstract or, for that matter, all art? Will it look as lackluster as the charts of Dow Jones or ARTNET, whatever Kandinsky wrote about the expressivity of a curved line[30] ?

[30] Investors seem to endorse Kandinsky's praise of the line. The stock chart can trigger emotions form gut fear to mad joy.

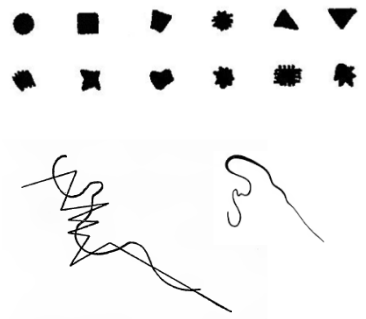
Abstraction is the job of mathematics, which turns everything, including products of pure imaginations, into clusters of abstract symbols and compositions of points, lines, planes, and breakneck surfaces that no skateboarder can brave.

The areas of mathematics that deal with lean abstract imagery of complex rich systems are graph theory, network topology, and, most importantly, Pattern Theory of Ulf Grenander. They, in a crude simplification, represent Everything as points connected with lines,[31] but here I will not repeat what can be found in original works of Ulf Grenander and on my website **spirospero.net**.

Instead, I will look again into *Point and Line to Plane*,[32] a short book by Wassily Kandinsky He proclaimed "points" (dots, spots, and small pictorial elements) and lines (curves of variable thickness) as basic primitive components of painting. Abstract painting, therefore, is a combination of "points" and "lines" served hot and cold, fried and frozen, mixed and pure. That book was the art's counterpart of Martin Luther's *95 Theses*.

I find philosophy and language of Kandinsky religious, otherworldly, and anti-materialistic. What followed in art looked like the opposite. The spread of abstraction has been compared to flood (some artspeakers) and fire (other artspeakers), but nobody was hurt in the free world, to which Russia has not yet ever belonged. Moreover, art has become insurance against both flood and fire—in both metaphorical and legal ways (ART AS MONEY, of course).

If the reader has not yet guessed, I am not a big fan of abstract art. Yet I confess that the sweep, intensity, and variety of Kandinsky's own paintings are irresistible. The same qualities make me defenseless against the multifaceted Picasso. But I see Andy Warhol (who also left his written Analects, if not Theses) and other modern art saints as anti-Kandinsky's counter-reformation. The worship of ordinary universally recognizable objects, like soup can, flag, dollar sign, polka dot pattern, and animal in formaldehyde is the triumph of materialism against any vestiges of idealism in art.



Points (above) and lines from Kandinsky's book

Kandinsky's points and lines are **independent** elements meaning compact "static" non-directional spots (points) and drawn-out dynamic strokes (lines) that, combined with points, imply time, movement, and process. His plane is the bounded area where the points and lines reside, sending various emotive and spatial messages. The process of interpretation is essentially the same as divination on intestines, sooth, coffee dregs, and cards, only with their pictures rather than real things. An at random taken Kandinsky is as good as cards to predict where your current love or business affair will bring you. Card and palm readers have not yet discovered that.

What I mean by points and lines is something different.

[31] See, for example, *History as Points and Lines* by Yuri Tarnopolsky and Ulf Grenander.

[32] Available on the Web: https://openlibrary.org/books/OL6033439M/Point_and_line_to_plane and https://archive.org/details/pointlinetoplane00kand

I have a good, solid, newsworthy, not postmodern but—higher up—super-modern example of what I mean by points and lines: network.

Configurations (networks) of points (elementary components, "nodes") and connecting lines (links, bonds) is exactly what the abovementioned mathematics is about. The points are neither geometrical points nor Kandinsky's points but just anything that is or is not connected to another point: people, computers, words, species, institutions, bones, nations, and thoughts. Line is not a geometrical line but a pictorial symbol of connectedness, which can also be portrayed without lines: as a matrix. This is what mathematical abstraction means: no dichotomy between the object and representation. These features are fundamental part of Pattern Theory, but Ulf Grenander took further steps by attributing to abstract configurations such realistic properties as probability and energy. The theory is radical and not yet fully appreciated, probably, because sciences and humanities are still worlds apart in both paradigms and material rewards.

Ulf Grenander's "points" (called *generators*) are somewhat close to chemical atoms but they have individuality and complexity, quite like real objects. The lines (called bond couples) are also similar to chemical bonds: they have energy: the measure of strength translatable into probability and back. There are stable configurations and improbable ones. My attempted contribution is another borrowing from chemistry: history and human relations are not just narratives and data but natural processes with beginning, transition state, and end. They redistribute the connections between points and so transform configurations. As chemistry can predict the most probable changes of structure, pattern chemistry might be a chance to foresee the future (as chemists and military commanders routinely do) without recurring to oracles and soothsayers. Do not expect market predictions, I wanted to say, but, on the second thought, who knows, maybe.

Network, the buzzword of our civilization, is a combination of points and lines connecting some or all of the points. Various patterns of connectivity (= topologies) are shown in **Figure 7.2** for computer networks in which computers are "points".

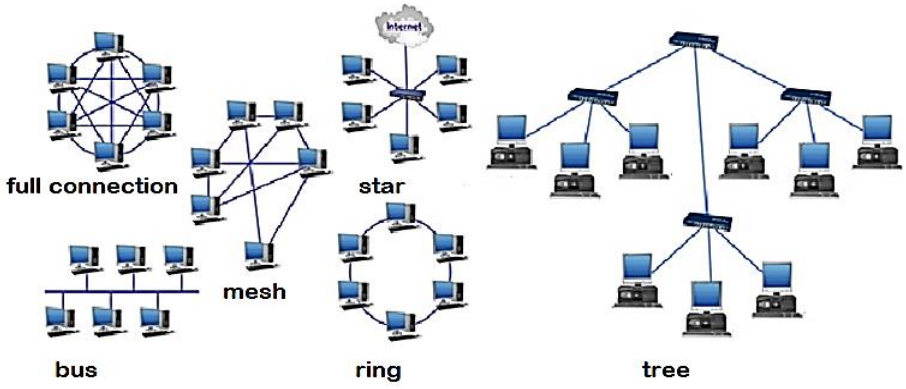


Figure 7.2. Network topologies for computers.

Culture, art, science, philosophy, politics has always been networks of communication, control, interaction, and influence. So are trade, manufacturing, and finances. Networking is a condition of personal social stability and advancement.

Art has a tree of its own. In 2012, the New York Museum of Modern Art (MoMA) hosted the exhibition *Inventing Abstraction, 1910-1925.*

Map 1, **Figure 7.3A**, was created with the help of network specialists. It shows links of influence and personal contacts between the artists and cultural stars of that period. Thus, it includes the poet Apollinaire and dancer Nijinsky. The most important artists have the largest neighborhoods of "friends". The amazing **interactive** (!) map places Wassily Kandinsky in the center of the entire abstractionist movement, which some enthusiasts called, testing the limits of artspeak, "our Renaissance." The Web page shows also partial art maps, all looking like a chaotic tangle of labeled spots and, sometimes, labeled lines. They represent the personalities in the nodes of the network. The maps are complemented with biographies, comments, and graphic materials retrievable by clicking on the nodes. This is a real treasure. I list major links:

1. Art history charts
2. Main page
3. Interactive main network
4. Interactive individual networks
5. Main network, pdf
6. Text



The main art network is shown in **Figure 7.3A**, but it can be fully appreciated only on the MoMA web site. It has the topology of a dense mesh of stars.

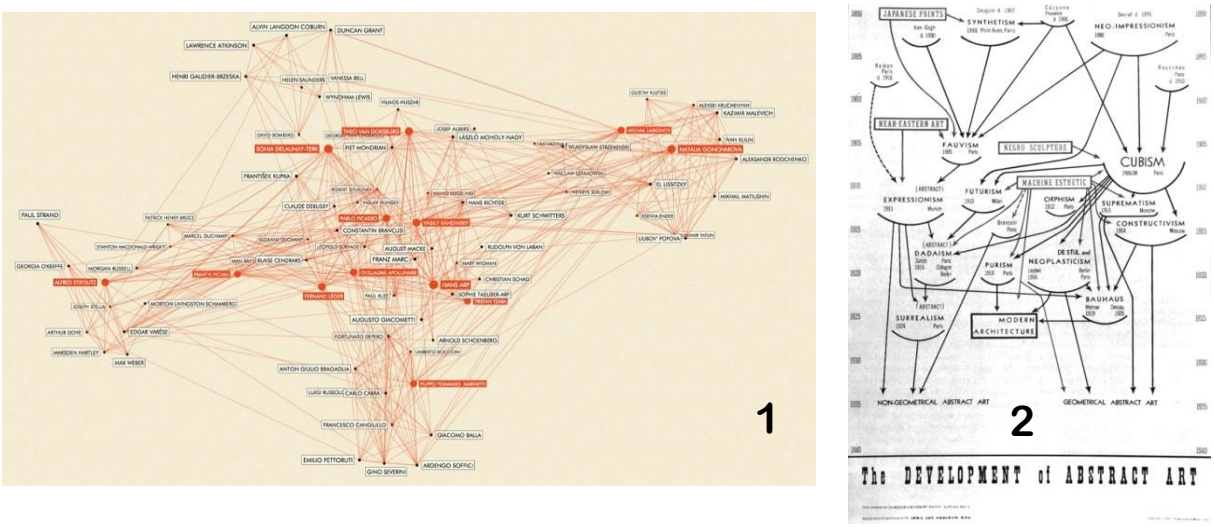


Figure 7.3A. Art maps, see ARTNEWS , *MOMA makes a FACEBOOK for abstractionists*, by Robin Cembalest , 10/02/12 . 1: MOMA's map; 2: Alfred Barr, 1936

The MoMA Grand Map of 2012 in "*Inventing Abstraction*" is not the only points-and-lines representation of art history as a network. The time component for it was not crucial because of the shortness of the period of flood and fire, but there were quite a few attempts to include time into the picture, as the right sides of **Figures 7.3 A** and **B** show. More art history charts could be found on the MoMA site and elsewhere, see **Figure 7.4**. Among them, the gracious tree of Lynn

Elliot Letterman, who devoted a branch to feminist art, and the super-complex tree of Greg Neville stand out. They, together with the most popular tree of Miguel Covarrubias, reflect some important **topological** distinction of art from life.

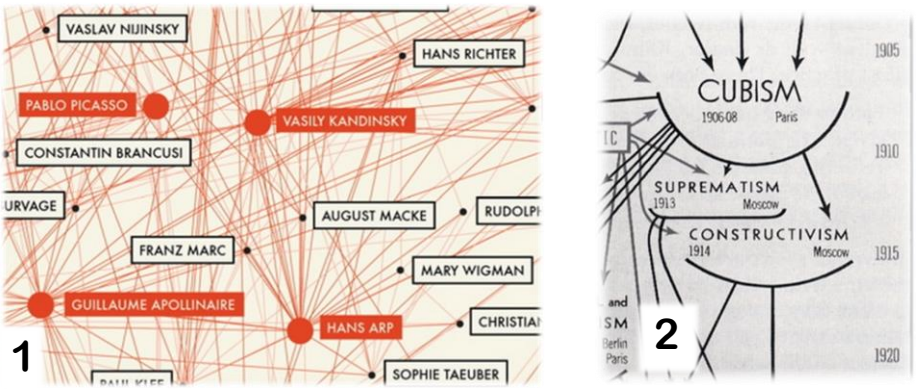
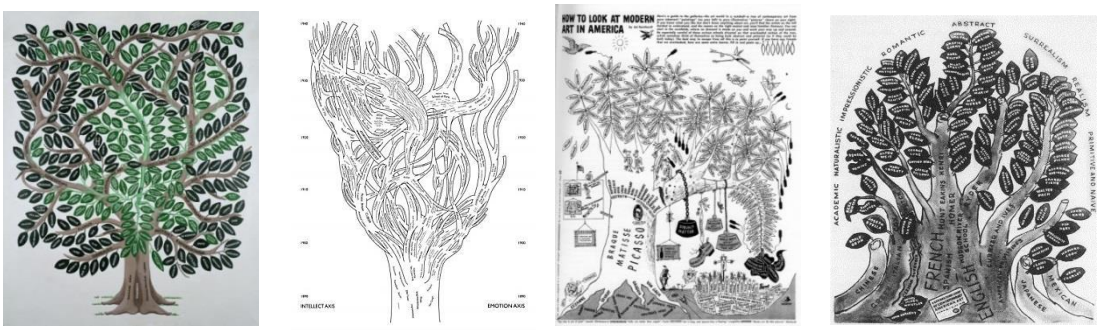


Figure 7.3B. Fragments of maps in Figure 7,3A.



1 **2** **3** **4**

Figure 7.4. Modern art trees. Authors: 1. Lynn Elliot Letterman 2. Greg Neville, 3. Ad Reinhardt, 4. Richard Pousette-Dart. Sources: 1a, 1b, 2a , 2b, 3 and 4.

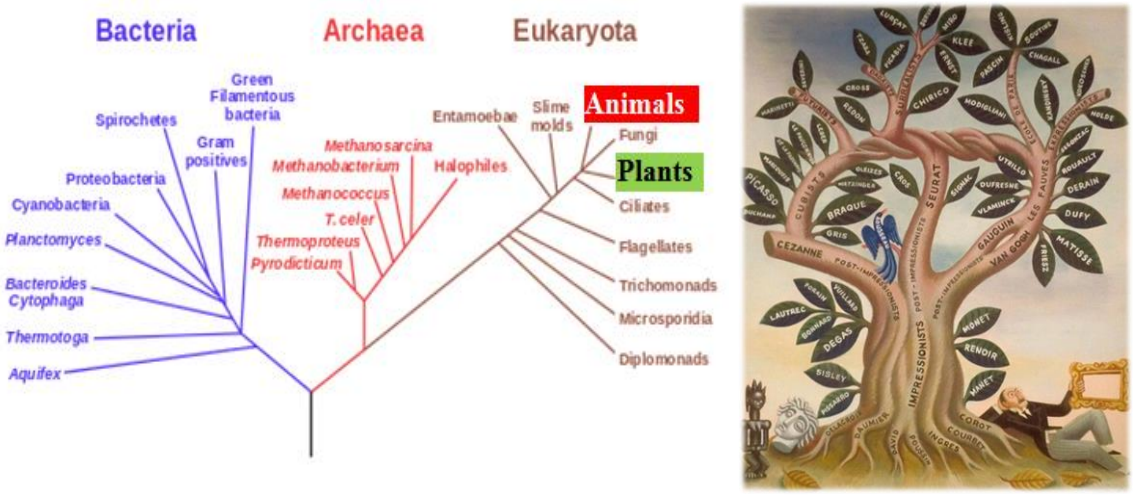


Figure 7.5. Left: Diverging tree of life; right: converging tree of modern art (by Miguel Covarrubias, 1933)

Miguel Covarrubias put Henri Rousseau on the tree not as a leaf but as an exotic bird (**Figures 7.5 and 7.6**). I wholeheartedly agree with that. I think that Henri Rousseau (1844-1910), as a promise of fresh air, still belongs more to the future than to his contemporaries. The hyperrealism and fractal art (**Figure 7.1**) look, with hindsight, like his distant and unexpected progeny. It is hard to understand why the delicate Maurice Utrillo was placed among the stark fauvists, however. The consensus in attribution and interpretation of connections in art networks is hopelessly difficult to reach.

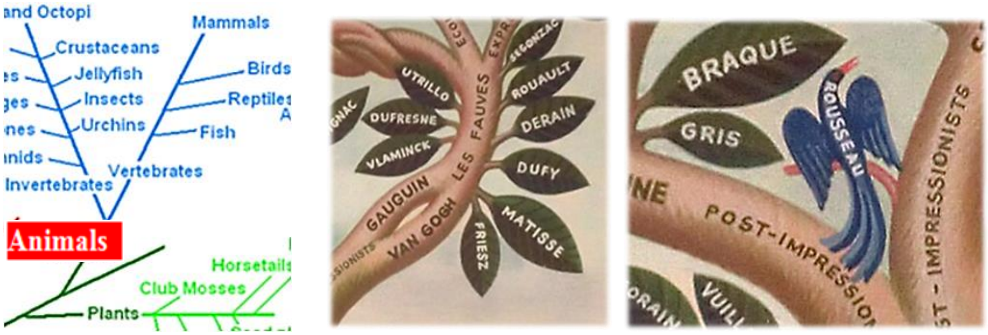


Figure 7.6. Fragments of pictures in Figure 7.5.

Tree is the standard representation of evolution of species and other systems with growing complexity. It is also used in linguistic analysis, genealogy, history of science, technology, institutions, philosophy, ideology, and any object with hierarchical structure, apart for drawing objects of botany. Artists, who are full-blooded humans, however abstract and skeletal in their creations, as well as biologists, who are at home in a tree-house, are charting their trees growing upward, trunk at the bottom. In linguistics, they are upside down.


ring

It turns out that the evolutionary trees of art do not have the pure tree topology, which requires the absence of rings. Their tangled networks combine rings with strict branching of tree topology.

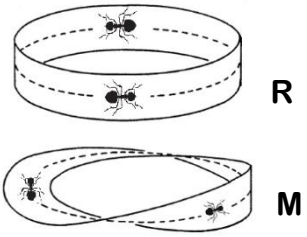
What does it tell us? Topology, unlike "network," is not a buzzword today, maybe, for a good reason, but change in topology is one of the most profound changes that can happen in the world. It does not happen every century and not even every millennium.[33] We are right in the middle of a topological revolution and I am going to allow myself a digression about the new topology of our good old round world, already with tentacles into the space.

I have been fascinated by topology since my school years.

Topology is a property of space, whether discrete, like network, or continuous, like our earthly habitat or something we can only imagine. The most popular illustration is the Moebius strip which everybody can make from a strip of paper.

[33] I would say, it happened only once before with the emergence of human brain in which anything could be connected with anything else. Will the future world need of humans as dumb as neurons? Joseph Stalin praised humans as dumb as, I quote, "little screws" (винтики). Will art need only minimalists? They will be easy to recombine.

Two ants on the opposite—inner and outer—sides of a ring can never meet without crossing the border between them. On the Moebius strip, however, two ants are always on the same side and can communicate and procreate day and night. This is like Europe and America before the Age of Discovery: the two continents were on the opposite sides of the communication border. The Industrial revolution put all humans on the Moebius strip of knowledge and physical contact. Yet we were still separated by borders (never perfect) and distance (never impenetrable) from total **mutual** manipulation and control. The Digital Revolution has thrown us all into the borderless world because the increasing part of our personal existence has been taking the eerie dematerialized digital form.



Ring (R) and Moebius strip (M)

> Dematerialization is an ugly word, but I expect it to buzz like a heavy metal band in near future. It is the main problem of the Digital Age. Its Google output today is only 347,000 results (0.57 seconds). For the times when it exceeds one million, I suggest the term "demat." Remember me then.

Let us open the phonebook, like the one that is being delivered to my mailbox—newspapers are not anymore—but sits for a year unopened on top of the fridge. The phone company maintains its network of subscribers with **potentially** full connection topology. The subscribers listed on its White Pages consist of three kinds: (A) those who know about each other's existence and have communicated at least once, (B) those who have never called each other but know about the other from the phonebook and would call in need, and (C), those who would never call one another except by mistake. This distribution changes with time: "never say never." Of course, I neither know nor want to know who is who in the entire book, but the telephone company in principle can find out from their digital records. Although hardly used, this knowledge exists openly and is of acute interest in matters of national security.



I cannot resist an urge to quote Michel Houellebecq as evidence that topology begins to slowly trickle into literary fiction, although this particular piece of fiction is chillingly realistic.

> Think of an X-Y graph, Rediger wrote, with individuals (points) linked according to their personal relationships: it is impossible to construct a graph in which each individual is linked to every other. The only solution is to create a higher plane, containing on point called God, to which all of the individuals can be linked—and linked to one another, through an intermediary.[34]
>
> Michel Houellebecq, *Submission*, Farrar, Straus and Giroux, NY 2015, p. 224.

It is the **existence of the directory,** whether on paper or in computer memory**,** that makes us all **potentially** connected, but there is no way to know the **actual** connectivity of any network unless somebody studies it by spying or the network itself keeps the records and discloses it. The telephone company lets me know only my contacts, i.e., my neighborhood of connectivity, in which **I am a star**. We cannot know people with whom we are not connected in any way, but the directory manages to **potentially**



[34] It is possible to construct such a graph of full connection, but impossible to realize it on a large scale. What the author suggests is the star connection.

connect us anyway.[35] What seems so meaningful to me is the absolute ubiquity and availability of **recorded** or **recordable** network data. This is the historical computer-generated novelty of modern civilization. Our souls and pockets can **potentially** be open to each other and those who watch us from afar. As for "points called gods," they are as real as you and I, but their plane is too high for this Essay. Our very existence, that we are dying to make known to the world, can be our major point of vulnerability if it is known. What has that to do with art? I will come to that in the very end.

I have no reason to believe that my cable connectivity provider uses my meagre data for anything but its business and outrageously expensive billing. Unlike many people, I also understand that absolute privacy can have very high cost in the era of terrorism.

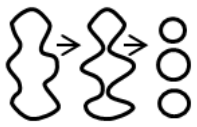
The situation is different with the enormous connectivity in the web of smart phones, Internet, and social media networks like Facebook and Google, which connect not only people with people, but also people with ideas, images, Things for sale, companies that offer them, scammers, hackers, and propaganda, stealing enormous amount of personal time—the only truly irreplaceable asset on this planet and in our lives. My **Essay 2: On the chronophages or time-eaters** was about that. Social media potentially connect everything in the Knot**: humans** (including their secret desires and thoughts)**, Things,** and **ideas**, to which disinformation and nexistence belong, too.



The Knot of Essay 59

I am not going to explore this subject any further. It is complicated (1) on its own, (2) because of connectivity to Government, (3) because of storing and exploiting the private data by the private companies, which makes privacy nonexistent, and (4) subversive connectivity between humans, companies, nations, and their enemies. This nervous system of the self-tightening Knot is still in development and the Internet of Things promises to tighten it another few notches.

The converging and circular networks are possible in human non-biological evolution because all their points exist in memory like all telephone subscribers exist in a telephone book, whether linked or not. This is the most important property of both human mind and computer which makes them to a significant degree, if not completely, potentially interchangeable. Humans and their creations are calling each other regardless of time, distance, and acquaintance. More importantly, humans have always remembered their history, real or mythical. With outsourcing history to computers, our past, present, and future can fall on three disjoined surfaces, (like three different balls) which is not as surreal as it sounds. It was described in some detail by George Orwell and made reality, for a while, in Soviet Russia.



I end here my digression with a clarification. I see the development of the current total connectivity as the unintended and uninterpretable in its time "prophesy" of modern art in the beginning of the 20th century. This is the central idea of this Essay.

[35] This is a very strange thing called data. The descendant of knowledge, it is the essential facet of modernity. If knowledge is your personal power, already equalized by the Web, data is the power of somebody else over you because you do not have free access to it. This is why it can be used for national security as well as insecurity.

By no means should this Essay be regarded as attack on modern art. I chuckle at *Untitled, 1962*, but modern art is a vast reservoir of freedom, even if canned and labeled "*Campbell Soup*." It is the opposite of what I loathe most in life.

Next, I am going to consider a different kind of a configuration with tree topology, this time about the substance of art as art. As a template, in **Figure 7.7**, I supply the tree of life with its root system never seen on such trees simply because we do not know much about the origin of life. We know, however, that all living matter consists of a limited set of atoms and every molecule in organism is just a combination of atoms. The tree of life is a record of evolving complexity of such combinations. Then what is art as artwork and not as network of personal relations? What are its atoms and molecules? This question is what unites Kandinsky's points and lines with points and lines of Pattern Theory.

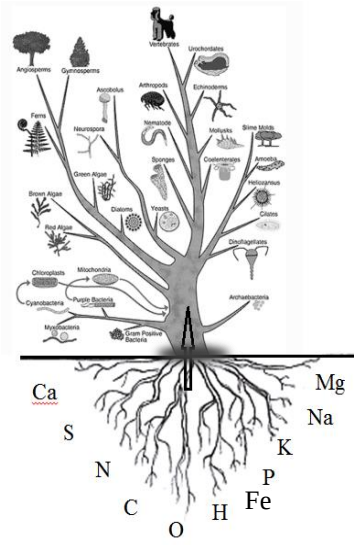


Figure 7.7. Tree of life with roots.

Modern art, unlike classical art, is not constrained by the object even in photography. It freely combines elements of reality and imagination, as well as appropriated tricks of other artists. It makes new elements and combinations, transforming the old ones.

Next, I will show yet another type of art tree: the impersonal one: the tree of styles. I will arrange it along the axis not of time but of complexity. I want to show not only how different the tree of art is, but also the consequence of this difference.

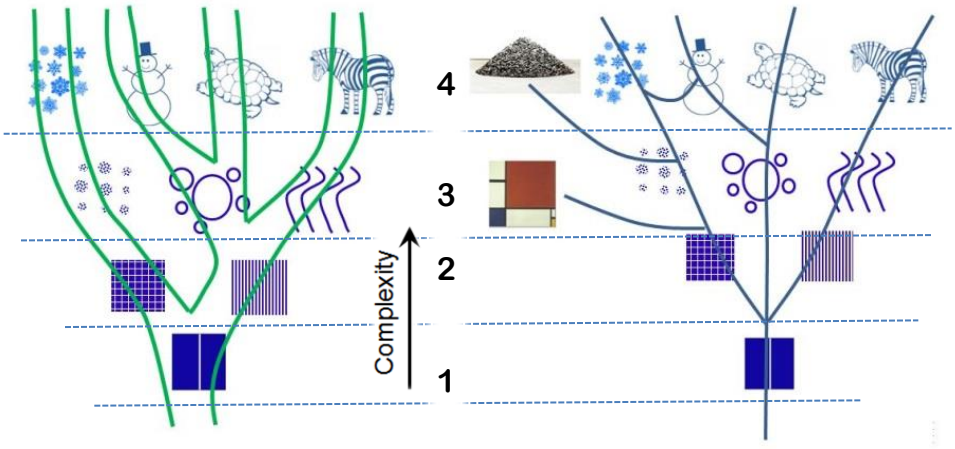


Figure 7.8. The tree of complexity

The left part of **Figure 7.8** has in its root (Level 1) Barnett Newman's *Onement VI*, a picture of extreme simplicity. Consisting of a blue field and white "zip", it opens a way to multiplication and recombination of white lines at Level 2. The lines begin to deform at Level 3, kept in shape by external constraints of snowflakes, turtle, and waves. At Level 4, the primitive pictures acquire more complexity and realism. The closeness of the snowflakes to the pre-turtle makes possible, do not ask me how, the split of the turtle into the snowman and the definite turtle. The tree of complexity grows under the constraints of reality. The right part of the **Figure 7.8** adds

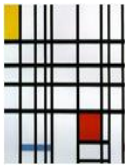
new paths of evolution toward modern art. We see two iconic pieces: the pile and the grid of Piet Mondrian, each preserving some components of their neighbors: orthogonal grid at Level 2 and particulate consistency of snow. In the evolution of modern art, ideas are freely interbreeding with natural objects.

What I omit in the **Figure 7.8** is the long road from the primitive art through millennia and the hard toil of classical art toward becoming modern primitivism and minimalism.

The tree of complexity and sophistication is tangled. One could say that minimalism in art is similar to the minimalism of simple organisms, the germs that successfully coexist with humans. But the germs, fungi, and microscopic algae have been developing uninterrupted, while abstract art and the barrage of pop cans just fell from the skies after the ages of sophistication.



What does the prophetic art want to tell us? Is our civilization secretly exploring the ways toward the rectangular order of Mondrian-colored prison bars and windows? I will leave the question hanging in the air. I do not have either a consistent theory or sufficient material or just remaining time to think about it. Life is short.





To conclude this difficult monologue, I offer a visual parable of the current topology of art as a reformed tree, **Figure 7.9**. The topology of our art—and, I believe, of our civilization—is moving to **full connection**. Anything can be anything else and mixed with anything. Anything goes. Anything is there in the phone book/Google, just call/click on a whim. Anything but money is on a plate. Everybody and everything wears a mask and to trust the appearance and rely on promise is a risky game. It is the world of submission to order.

Art, science, technology, culture, and everything created by humans has been evolving like a tree by divergence and specialization, similarly to the evolution of living species. In our time, however, human creations and even living species are acquiring a new freedom of intercourse or repulsion between themselves. They fuse and grow cycles. The reservoir of freedom is bursting at the seams.

Everything influences and interacts with anything else. This creates a real mess in our age of artificiality in which humans, the pure product of natural evolution, have to mate with their own artifice.

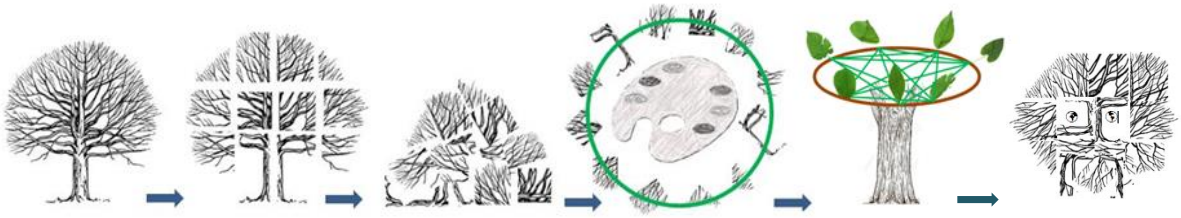


Figure 7.9. Reforming the tree of art

The watch is mating with computer, tomato with jellyfish, France blends with North Africa (creating huge tectonic tensions), and the Frankensteinian mix of theater, installation, artist, torture, nudity, and public in performance art is drawing crowds[36]. The diverging tree of civilization begins to converge, as if the branches of an oak started to fuse with each other. Ideas and social structures mix, too. We are witnessing the ultimate barbarity of bygone millennia coexisting today with the refinement of elites, glamor of Paris, entrenchment of liberalism, and the oxymoronic **anarchic conservatism** of the Republican Party in US.

I have to stop and change topic before I begin to question the prospects of a reformation of life along the pattern of the Reformation of art with its artspeak and eerie art market.

[36] Marina Abramovic at MOMA, 2010

8. ART AS SHADOW

My primary assumption in this Essay is that art is an *exystem*: evolving complex system. So are life on earth, society, its culture, institutions, and knowledge. Larger exystems can have smaller sub-exystems and modern art is a sub-exystem of culture and economy where both overlap, keeping politics at safe distance.

> Exystem is a realm of individuality, while physics is, traditionally, a realm of generality. Chemistry, for which each of countless chemical structures is unlike all the others, feels at home with human individuality and needs only the generality of physics to bridge human matters with the rest of the universe, inhabited or not.
>
> I want to look at art from a very general point of view in order to understand what happened when classical art had entered its modern stage, which is now already historically old. At the same time, I expect art to reveal to me something I do not know about the larger exystem that incorporates it. I believe that all exystems have some important properties in common, which is to say that they share some patterns. This idea is not quite new. Thus, evolution of technology and evolution of life are topologically similar processes. They are represented by the same tree-like maps. This is a big and complex area, however, and I will not go there in this Essay. There is more about it on my **COMPLEXITY** site.

Next, I am going to explore, three-quarter-seriously, the origin of imagination by exerting my own imagination. I want to imagine myself a troglodyte, a cave dweller, one foot in the cave, the other in today. I see nexistence as the product of imagination that somehow is capable of evolving into a mass belief that moves individuals, couples, dozens, hundreds, and millions of people with hardly predictable but *post factum* explainable results. I separate dozens and hundreds from millions because the millions are usually put into action by small groups created by individuals. Modern art, unlike other spheres of human activity, does not enthrall many millions of people (pop arts do), but it keeps an avid eye on millions, anyway, as any industry does.

Since E. B. Tylor (1832 – 1917), anthropologists noted the possible role of dreams in the origin of religious ideas.

Dreams are not a good object to choose as a counterpart of reality. They have realistic visual details of "this world", are uncontrollable, inconsistent, overall senseless, poorly remembered, and occurring only for a short time in specific circumstances of our life. Their content is limited. They are shredded, spliced, and distorted visions of day life, composed of convincing fragments and sometimes stories (have I just formulated the essence of all postmodernity?). Dreams are passive and spontaneous, while imagination is active and controlled.

I cannot argue with the power of dreams in human life, especially in past centuries. Instead, I want to draw attention to something more common and universal: the dichotomy between real and imaginary that goes through the history of art. One can say that Jackson Pollock's drip technique is fully spontaneous and has nothing to do with imagination, but Pollock definitely controlled the gradually developing picture, selection of paint, and the endpoint.

Taking to account the *unimaginable* craziness of modern art, there could have already been an artist who painted with his eyes closed. If not, there will be one.

And now let us jump not just centuries but 20,000 years (the age of the Lascaux cave pictures) back in time.

I am a Stone Age human with some emerging capacity of speech. My cave name is Ogg.

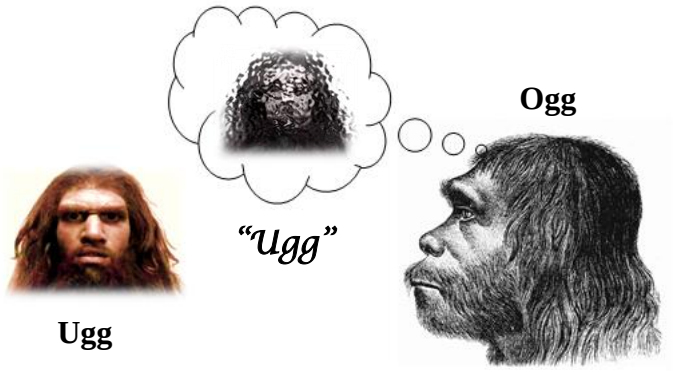


Figure 8.1. The two worlds of the first humans.

In **Figure 8.1,** I show my selfie and the shot of my good-looking pack mate and rival Ugg.[37] I look neat enough in my picture, but Ugg is really unkempt. If I look like a daydreamer, it is because I am. I will still be a daydreamer 20,000 years later.

There is a second image of Ugg, of a much poorer quality. Because it is always with me, I conclude that it is in my head, but I am not certain. I cannot look into my head. There is nothing but brains in cracked heads of other people.

The process of becoming human brought about a great complication in the work of the mammalian brain. The rest of human evolution until very recently has been spent in adaptation—ultimately, successful—to the duality of human existence tossed and torn between the real and imaginary. Man-made ideas and idea-made men created the third loop of the Knot: man-made Things.

I perceive all existing Things and life forms in two different modes. One is the mode of direct perception, WYSIWYG (*What You See Is What You Get*), or, better, WIGIWIS, *What I Get Is What I See*, i.e., I see Ugg. He is right there, I can touch him, and his presence creates his image.

The other mode is WISIWIT, *What I See Is What I Think*: I see Ugg in my imagination, with closed eyes, in other words, **I *think* about him. My mind,** not Ugg's actual presence, creates his image. Although it is **my** mind, I have some limited control over it, which I share with instincts. They are more powerful. I still do not have any power competing with my animal instincts except for the similar instincts of others like myself. Quite often, we get physical. By way of understatement, this is called healthy competition.

[37] I have no idea why all artists portray early people as wildly disheveled, untidy, and menacing brutes. Even animals take care of themselves and groom each other.

My daytime eyes-shut mental image of Ugg is not the same as the eyes-open one. It is more like a *shadow*. It has few, if any, details, none of them exact. Although I can see the *shadow* of the wart on Ugg's nose if I want, I never pay attention to the color of his eyes because we all have the same color. I can see Ugg from behind, running, or lying on his back, yelling or growling, eating or hunting. I can even see him dead, although he is enviably healthy. I *know* that it is Ugg. The *shadows*[38] of other pack members are different, but have similar properties.

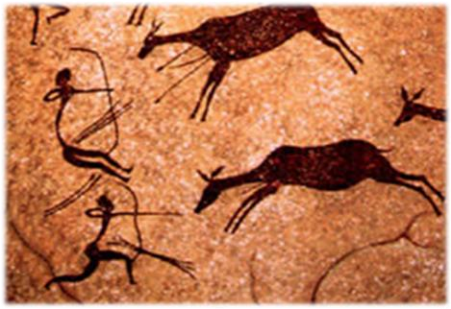


Figure 8.2. Ugg (below) and I at the tomorrow's hunt.

There is something else in my head when I close my eyes: words. I can hear them ears-open or ears-shut, quite like the *shadows*. I hear them and I can play with them a little even before I speak. I can say Ugg's name and call him when he is out of my view, behind a bush or a rock. I can also imagine (i.e., see its *shadow*) an antelope and even paint its *shadow* on the wall of the cave, appropriately arranged with other *shadows*. I can imagine an antelope killed by Ugg, although I do not see the act of hunt and the jubilant Ugg himself laying a new arrow on his bow. If Ugg was indeed dead, I would see his *shadow* same way as I see the *shadow* of Ughh, his younger brother who has been already two moons dead after being hugged by a bear.

Now I am switching back to my real self (one foot still in the cave because I want you to meet somebody else there). To my surprise, my thought experiment has shown me that the most dramatic difference between Ogg and me is a larger vocabulary and ability to read, which is not that much.



Here or there, I find myself in two distinct worlds—something Emile Durkheim (his wild look is deceiving) is considered the beginning of any religion. My and Ogg's two worlds are (1) reality—the close and explored environment of my clan—and (2) the *shadows* of reality in my head.



This is Aggie remixed by Picasso

I, Ogg, begin to perceive **reality** as consisting of combinatory elements such as head or leg of the antelope, rain or shine from the skies, and my hunting mate Ugg or my sex mate Aggie, here she is, dear.

The combinations are not chaotic and I begin to understand what keeps them in shape: the constraints of the patterns. The leg cannot grow from the head, rain never goes up toward the skies, and Aggie's portrait by Picasso is sick offensive slander. The origin of Picasso's art is even darker than the origin of religion and you really need to believe in something out of this corporeal world to consider it art. I need a mediator—an art critic, an art investment advisor, a priest in the temple of Muses—to reconcile me with it. I am intentionally confused, playing Hamlet.

[38] The term *image* is already taken by Pattern Theory as well as other sciences and arts.

The real world requires knowledge and, ultimately, science. I do not have any power over the laws of nature, but I can use them. I trust my senses. I can connect the cause and effect. The lightning causes thunder. Gravity and wind direct rain. I observe and take a note of regularity. I dive into the world of *shadows* to fish for hypotheses and generalizations. I begin to distinguish between opinion and fact. The root of knowledge is bitter, the road to understanding is long, and life is short. My descendants' power over nature and man-made Things will possibly grow for the next 20100 years, but human power over humans will always be limited and shaky (written during the US Government shutdown by the tribe of cave Republicans in 2013).

In the world of *shadows*, I have a different kind of power (I can, for example, make Democrats win in 2016).

I begin to perceive the **shadows** as consisting of combinatory elements such as head or leg of the antelope, rain or shine from the skies, and my hunting mate Ugg, and my sex mate Aggie (who has some fabulous non-combinatory elements of her own). In my *shadows*, a leg can grow from the head. Why not?

The combinations are sometimes chaotic, but the *shadows* differ from *reality*. They have much less constraints, more freedom to divide, splice, and recombine. The **laws** of *shadows* are much looser than the laws of nature. I have a lot of power over them. Thus, although Aggie is mine, I can see *shadows* of Ugg mating with Aggie, and that does something to me, and I see the *shadow* of Ugg killed with the *shadow* of my arrow, and I feel good, although Ugg is still alive and well, (and this is the beginning of literary fiction).

Moreover, I see the *shadow* of triumphant Ugg over the *shadow* of my dead body. This is what it means: **I see the world not only as it is, but also as it can be or even cannot be.** And if all humans have two eyes, it is no problem for me to imagine and paint somebody with one eye in the forehead, or with goat's legs, or fused with a horse. And I begin to think that I am too hard on Picasso and his Aggie is a masterpiece, anyway. Along the road of *shadows* we can create images eyes-shut and we have to look out into the sunshine to see what is real. But how do we know what is **not** real?

My **ideas** (let us finally, 20,000 years later, use this word instead of *shadows*) consist of elements that can be combined and recombined along rules, but not necessarily the rules of the nature. Moreover, my first sounds can be combined and recombined into words and statements, not necessarily having anything in common with reality or making sense at all. To dream is as human as to err and to err is the usual price of dreaming.

There is the third world: instincts inherited from animals. Let us call it human nature. I put it side by side with nature because they rule over all animals, although its laws are not as powerful as the laws of inanimate nature. There is a long way from instincts to "a system of rules and guidelines which are enforced through social institutions to govern behavior" (Law in Wikipedia). This system can be etched in stone or stacked on sheets of paper, but humans like to violate it in any form if it makes them feel good.

The mental images—configurations produced by imagination—harbor everything "non-natural." There is a small semantic distance between non-natural, i.e., not observable in nature, and such

potent religious notions as supernatural and unnatural. This is the area of a logical twilight where all cats are gray. If the supernatural exists, even invisibly, it is natural, and if we see something unnatural, it is natural, too. Otherwise, we would not see it. The supernatural is worshipped while unnatural is persecuted. The lack of logical basis under both notions leaves an ample leeway for the evolution of moral standards.

Back in the present, I am coming to the summary of my cave experience.

Humans imagine **new** ideas and test them against the **facts of nature**, which is the environment of the tribe. The ideas that do not contradict reality will survive. This process will produce science—the search for truth, constancy, and causality. Thus, if the earth looks flat, it is flat until proven curved.[39] The change that makes knowledge **stable enough** (not necessarily much more stable) will survive. Science is concerned with nature and consensus. Inanimate nature moves toward equilibrium. Animate nature is in a perpetual dance.

Humans imagine **new** ideas and test them against other humans, i.e., the **facts of human nature**. Some survive and stay as the laws of the tribe for as long as the tribe is stable. This route leads to culture. Change that makes the culture **stable enough** will survive. The culture that makes society **stable enough** (not necessarily **more** stable) will survive, until mortally wounded or naturally exhausted in fight with another culture. Culture is concerned with human matters and social order. Society is full of internal contradictions. In the knot of conflicting and contradicting strands of comparable power, the ideas, Things, and humans compete within and across the borders of these three domains. The more freedom, the less separating distance, the more chance of conflict, as the beginning of the third millennium testifies, as if the previous century was not enough.

Human produce **new** ideas and test them against **old ideas**. This is art: the creativity without utility (except luring a mate or a buyer). The most supernatural thing about art is that new piece just adds to the collection of old pieces (immortality?) and, paradoxically, its monetary value increases with age.

Modern art is based on the belief that it is art: a thing of value without utility and consensual meaning, assigned to its own marketplace and place of rest. And if it is created, displayed, and sold as art, it is art. Just believe me.

[39] I do not know what to make of the fact that, although President Obama's American citizenship is proven, it is still denied by many. My guess is that (1) denial is a form of belief and (2) the roots of beliefs are as much in the instincts as the roots of the teeth are in the jawbones. That's a pity because reason dwells just a little above the jaws. See the X-ray of a tooth in ART AS BELIEF.

9. ART AS BELIEF

In our times, the word "revolution" is slapped right and left on any new product, technology, treatment, and self-help with cries "Disruptive!" or "It will change your life!" This is what revolution is about. Revolution often changes one set of restrictions for another, however.

> I suppose that the revolutionaries are those who are capable of coming to terms with the brutality of the world, and of responding to it with increased brutality." [40] (Michel Houellebecq, *The Possibility of an Island*, Vintage International, 2007, p. 109).

This is why I prefer the word "Reformation" for the beginnings of modern art. Reformation can relax or reject the constraints and I use the term in this sense. But the term inadvertently evokes religion.

Reform Judaism is an attractive example of relaxation, but religion is a complicated and sensitive subject. If I may put it in the same paragraph with religion, sexual revolution it is another example. It has already morphed into the initially non-intended relaxation of marriage and treatment of sexual minorities, although a one-way bombardment by anarcho-conservatives is still going on.



Marc Quinn, *Self*. Artist's frozen blood. (1991-…)

Like the European religious and modern wars that had ended, recently, with peace, coexistence, and increased diversity in Europe, the Reformation in art did the same without a shot, although not without some blood spilled… Relax! Blood in art is only medium or component. Check out: Body fluids in art (Wikipedia) and look up Marc Quinn's *Self* , which he refreshes up every five years.

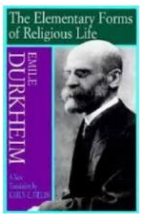
As Sarah Sze's *Triple Point* (2013)[41] shattered my outdated vision of modern art, the public seemed to be roused, too. I ran into the following theory of Paddy Johnson, an insightful and, on that occasion, skeptical art writer:

> My theory is this: The show is both a production-site and graveyard for the relics of an unnamed religion. Members of this cult worship reproduction technology and mass-produced items of any form (Paddy Johnson ; she also finds that it "looks a lot like contemporary life." *Brava!*).

[40] Houellebecq keeps modern art in the focus of his "*The Map and the Territory*," (2012), which, as well as his *Submission* (2015), I find groundbreaking.

[41] See also: A, B, and C. Photo shots from multiple points at Flickr (C) give the best representation of 3D objects.

That was the moment when I decided to retrieve Emile Durkheim's *The Elementary Forms of Religious Life*[42] from the back stacks of my bookshelves.



I had bought Durkheim's book long ago for $3.99 at a book sale but was never able to read more than two first chapters. Only when I, jolted by *Triple Point*, had made another, more successful, effort, I understood that it should be read backwards, starting with *Conclusion* and, maybe, stopping after that.



Nexistential promises and threats.

I think that what **modern** art, **modern** ideology, and **modern** religion have in common, apart from being **organized**, is *nexistence*. I am not going as far as to generalize over *contemporary life*, however, despite of strong temptation, because we have two divergent subspecies in the postmodern *Homo sapience* with contrasting existence, as well as nexistence. Paradise, hell, salvation, Nirvana, immortality, "chicken in every pot,[43]" million bucks overnight, Communism, Putinism, Trumpism, world domination, debt, insurance, market games, security, and the combustive tea of the Tea-Party zealots—all that consists of promises and threats, all of them about the future.

Nexistence—the content of a socially powerful statement without evidence and proof, **nothing treated as something**—trails behind an artwork in the form of comments, analysis, comparison, evaluation, explanation, and interpretation. Unlike the nutritional value of a new sandwich or the magic abilities of the next iPhone, it is impossible to check whether the comments make any sense. There is no universally recognized connection between what we see and what we read and hear.

Nexistence is a necessary source of order for human society because nature has no laws for such



unruly objects as humans. They are capable of creating novelty, which disobeys algorithms, laws, and the body of knowledge. Throughout the universe, nature prefers to bar the lawless novelty from entry into the world by keeping the immutable laws of nature on the book—unsuccessfully, as I submit, in case of humans. The only law that nature can offer humans is death and we are not happy about that, fighting nature with arts and other long lasting stuff—a kind of pillow fight because nothing lasts long in our time, especially if digitalized.

All human matters—at home, at work, in temple, or on Wall Street—involve belief, which, alloyed with doubt, trust, and desire, is a driver of human behavior.

Belief is what pulls people together in crowds and pits them against each other in fights.

[42] Originally published in 1912. Translation by Karen E. Fields, The Free Press, 1995

[43] "A chicken in every pot" was promised by Henry IV of France, Catherine the Great of Russia, and Herbert Hoover of the U.S.

Reason needs to believe in itself in order to overpower a false belief. Two incompatible beliefs can play seesaw.[44]



We can believe in tomorrow's rain and believe that global warming is nonsense. While attending temple, performing rituals, and choosing martyrdom are verifiable **facts** of behavior, an individual **belief** is not verifiable because of the non-yet-existing future as its constituent. Moreover, a declaration of belief can be simply an expression of the current mood, state of mind, calculation, and intent. Trusting a promise, or dreading a punishment can mean a different, belief, deeper hidden, with roots in personal history.

The breakup of a link between the image (fact) and its meaning (idea) is the essence of the Reformation of art. The modern artwork and its "understanding" or "meaning" are in different universes. Image is shared but its perception is individual, quite like political statement, and this is why politics is a genre of performance art.

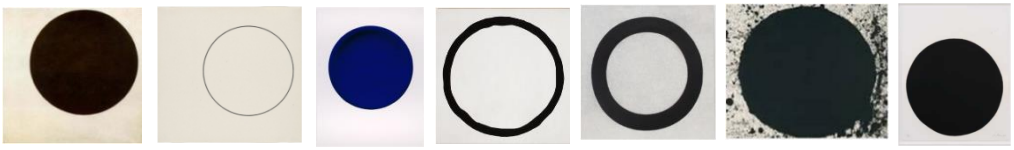
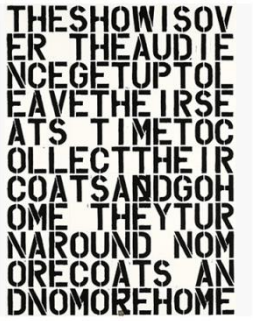


Figure 9.1. Going in circles. Kazimir Malevich, *Black Circle* , 1913; Ellsworth Kelly, *Circle line*, 1951; Ives Klein, *Disque bleu*, 1957; Jiro Yoshihara, *Work*, 1967; Richard Pousette-Dart, *Black Circle, Time* , 1980; Richard Serra, *Coltrain*, 1999, and *Billie Holiday*, 1999.

An abstract painting is a canvas with a distribution of "lines and points," some of them recognizable, but its interpretation in plain language or artspeak has no logical or semantic connection with the material reality. You can only believe in something **beyond the appearance** of a simplest circle. Your belief is personal, subjective, and it may not agree with beliefs of the artist and others. Seven circles in **Figure 9.1** (a small part of all painted circles) are another illustration to the problem of degeneracy of form as well as disintegration and dispersion of meaning. Of course, there is nothing in the tenets of modern art that requires meaning, but artspeak needs something for a subject; not the weather, really.



Christopher Wool (b.1955), Untitled, 1990.

In postmodern art, you do not need either to believe in anything, to feel something, or just to believe that you feel. To say that you *believe that you feel* is more than enough. I see in this only a cause for celebration because you, the viewer, are entitled to the same degree of freedom as the artist: the freedom of irrelevance. But I hear the gong calling for my mantra: art is what is called, displayed, feigned, played, celebrated, praised, extolled, enjoyed, loved, criticized, ridiculed, hated, and sold as art.

[44] Tamar Szabó Gendler developed a concept of *alief*, a counteracting instinctive satellite of belief, but I mean cognitive dissonance.

The difference between image and meaning is erased in the genre of "word art," an astronomically distant relative of Chinese calligraphy, exemplified by Christopher Wool's *Untitled*, 1990.

> *THE SHOW IS OVER* highlights what for Wool were the relevant questions for a young painter at the edge of postmodernism: could there still be meaning in the act of painting? The answer is at first 'No' and then perhaps 'Yes'; the work inspires a continual debate within itself. In this iconic work, Wool questions as he celebrates the tension between act and image, high art and the simulacrum of the real. (Auction comments).

Abstract art as *nexistence* echoes another *nexistence*: the future, which is, being the heart of any religion and ideology, is a matter of belief but not a matter of fact.

Belief-doubt-trust is the rock-paper-scissors game of modern culture.

Exactly because modern art is elitist, like anything in the shadow of wealth, it has the highest potential to stay away from the pressure of the crowds and carry a sincere, though cryptic, message about something concerning our civilization.

The succinct *Conclusion* of Durkheim's large volume is rather independent from the entire second-hand and often arbitrary or erroneous bulk of his book about tribal rites of Australian aborigines whom he had never faced. While reading the *Conclusion*, it occurred to me that it is applicable to a much larger area of human matters not necessarily associated with religion: collective—shared by hundreds or millions—beliefs.

Humans need beliefs as a map in wilderness, and it does not matter of what kind, as long as it makes them happy or scared. We sniff each other over for beliefs. An alien smell is discomforting for most, while the familiar one soothes the anxiety. Collective beliefs maintained by institutions are both glue and solvent of society: they unite and separate the human molecules and so keep social chemistry—or, if somebody prefers, machine—going.

> **NOTE**: I believe that belief, when proof and science are non-existing or unavailable, **is** science. Religion, therefore, was the first form of natural science. It had no alternative. Then why people sinned? Because they saw that their experiments with sin were inconclusive. They still are.

Durkheim does not use anything like *nexistence* in his terminology. He divides everything that humans deal with into two different domains: sacred and profane. Spirits, gods or God, Greek *eidola*[45], dead ancestors, demons, soul, taboos, and anything where an individual has no choice belong to the realm of the sacred. Are objects of political correction sacred or profane? Decide for yourself.

Durkheim's idea was that the sacred **beliefs** acquire their powerful organizing and uniting status because of the unconditionally believable **facts**: man-made visible and touchable paraphernalia, totems, images, narratives, art, rituals, taboos, and other tangent and transferable things existing

[45] In ancient Greek literature, an **eidolon** (plural: **eidola**) (Greek εἴδωλον: "image, idol, double, apparition, phantom, ghost") is a spirit-image of a living or dead person; a shade or phantom look-alike of the human form. (Wikipedia)

in time and space. As abstract art is instinctively anchored in reality, religious beliefs seem to be anchored in **art** of religious rituals.

The passionate belief is usually expressed in the flamboyant, forceful, and effervescent speech which itself is a form of art. You can get elated, but to take it seriously, you need to believe in what it says.

The so super-abstract that it becomes concrete *Untitled #7* (1984) of Agnes Martin,[46], consisting of 70 gentle horizontal pencil lines placed at equal intervals on white canvas (which looks pale pink on photos) has a real-life prototype: a super-concrete lined notebook sheet. I am unable to reproduce more than a fragment of the painting here because the lines are almost invisible. Her paintings of an earlier period are grids, like graph paper. Yet in the context of art:

Agnes Martin, *Untitled #7* (1984). Fragment.

As critic Nicholas Fox Weber points out, "Where there is reduction the paring down gives the object a life of its own. The work, consistently, is profoundly human, as emotive as ancient ruins, ineffably rich behind the apparent leanness." (N. Fox Weber, *The Hannelore B. and Rudolph B. Schulhof Collection*, New York, 2011, p. 11). This sense of humanity is clearly present in the horizontal bands of *Untitled #7* whose human scale and meticulously executed painterly surface exude a serene calmness that is contained within the very best examples of the artist's work. Source: Catalogue Essay .

A number of people have left evidence of their admiration of Agnes Martin's art. I cannot dispute their sincerity and have no reason to distrust their judgement. Yet I am sure no one can find ineffable richness on the front of the painting and there is only the lean signature and date "amartin 84" on the back.

Here is my major problem with belief.



Coliseum : a model of soul.

"Do you really believe that you believe when you believe?" [47] This triple-decker question, which I want to ask each time when I hear "I believe," I also ask myself, but my "I believe" means only "I guess," whether rightly or wrongly, with or without some rational arguments.

I know that my behavior is shaped by my beliefs, but how I act is always a result of the triple wrestling match between my belief, doubt, and trust, with logic as an absentminded referee. I suppose, this is what happens in everybody's ***soul***—a kind of the Roman multilevel Coliseum where gladiators and convicts fought animals and each other. Like the Coliseum, human soul has its visible from afar arcades and a hidden underground seen today in the ruins, where people and animals were waiting for their entrance onto the arena.

[46] Estimated at $2,500,000 - 3,500,000, it was auctioned for $4,197,000 in 2015.
[47] Is "I don't believe" also a belief? Norman Lewis: "I don't believe in belief"



Speaking about animals, a fleeting *shadow* has passed through my mind. In the animal shelter of an art gallery, the *souls* of the confined artists look from the canvasses at the passersby in hope to find a master who would believe in them and take them home. (Myspeak! See how easy is that?).

To accept the "never believe a belief" is too cynical. Beliefs in the right and wrong are usually real. They could be too weak to guide our actions, however.

Collective beliefs envelop an invisible, intangible, and undetectable body, like in inverted *Emperor's New Clothes*: emperor's new body. In the midnight of reason, you can be killed for wrong colors of your necktie.



Every belief, individual or collective, is ultimately about the future. Every ideology and every religion I know—with economics balancing between ideology and science—is a promise of a future reward or loss, punishment or prize. So are every political promise, spiritual movement, self-help guideline, nutritional fad, cult, current medical craze, and all advertisements, many of them truthful. The hallucinatory future throws the equity market, on which the wellbeing of many people now depends, into its tremors and bipolar swings.

The past can also be a matter of belief, but it cannot be changed, unless in the future, as the ideology of German past and Russian present illustrates.

There is a future, but the future **does not yet exist**. The invisible **future** fills up the visible clothes of our civilization with promise and threat. In a more than metaphoric way, the global economy, including the abattoirs and meat grinders of the African and Middle East wars, makes and packs the future like frozen hamburgers. But what does it have to do with art?



Filling in X-rays

Modern visual art is a mysterious domain of human matters. It cannot quite fit the Knot of **Essay 59** . It is a peculiar and utterly human strand of the Knot, in which ideas and Things are inseparably interwoven. There is something in art that becomes visible in modern times not as presence but as absence, like a cavity in X-rays. It is not an empty space, however: there is a filling made of something that I call *nexistence.*

Nexistence is a very strange thing. Does nexistence exist? Obviously, touching religion, I am asking for tooth pain.

Without the fetters of matter—something shared, visible, audible, wearable, or touchable—spirit can escape, evaporate, and join the clouds in the sky because airy thoughts dissipate, mutate, and recombine at the speed of fruit flies, if not molecules. Clay, papyrus, and parchment were the first sticky papers for catching thoughts, later to be bound between the covers of books.

Artwork does not promise any particular future, except some resale value, nor has it anything to do with social order and political structure of power. Still, there is a subtle and amusing similarity between modern art and religion as Durkheim saw it. It can be seen in modern secular

creeds such as movements for freedom, justice, and equality. The problem is that when you deal with **nexistence**, your enthusiasm, imagination, and creativity can focus on **existence** with a limitless intensity. This is what modern art demonstrates: anything is possible, anything goes, and anything sells (but not "everything goes" and "everything sells"). Modern art, lodged between flea market and stock market, is full of effervescent and exuberant extravagance. Becoming a professional revolutionary, you have to show more and more brutality in your art, pierce your canvas with a knife, burn it, or bleach the canvas to kill all germs of visual appeal.

Here is one of Durkheim's most important reflections and an example of what ritual pattern—or pattern in general—means. I quote:

> Nowhere can a collective feeling become consciousness of itself without fixing upon a tangible object; but by that very fact, it participates in the nature of that object, and vice versa. Thus, it is social requirements that have fused together ideas that at first glance seem distinct, and through the great mental **effervescence** that it brings about, social life has promoted that fusion (page 238; see? I have read more than the Conclusion).
>
> We have seen, in fact, that if collective life awakens religious thought when it rises to a certain intensity, that is so because it brings about a state of **effervescence** that alters the conditions of psychic activity. The vital energies become hyper-excited, the passions more intense, the sensations more powerful; there are indeed some that are produced only at this moment. Man does not recognize himself; he feels somehow transformed and in consequence transforms his surroundings.
>
> To account for the very particular impressions he receives, he imputes to the things with which he is most directly in contact properties that they do not have, exceptional powers and virtues that the objects of ordinary experience do not possess (page 424).

Figure 9.2 illustrates a new global ritual often observed during street riots. Its pattern roots go back to human heads on spears, the ritual which, slightly modified, is still practiced by Islamic terrorists.



Figure 9.2. An effervescent riot ritual: overturning a bus.
Left to right: UK, 1981; China, 2005; Senegal, 2012; Egypt, 2013; Ukraine, 2014.

Modern art is the riot that has become norm.[48]

In the context of time, the *Black Circle* , *Black Square*, and similar paintings of Kasimir Malevich (1878-1935) in which the title is an exact and full description of content, look like a peaceful exercise in overturning a bus. The pattern of overturning covers the emergence of abstract art, which at the age of maturity takes the form of painting and framing the titles alone.

For a pattern hunter like myself, any similarity is a fair game.

[48] This my formula is inspired by the best explanation of the historical pattern of Russian history that I know, first formulated by Marquis De Custine (1790 – 1857): martial law that has become norm.



"This is how we punish the traitors," French etching, 1789

What I have unexpectedly discovered looking at modern art is that beliefs are plastic as much as rigid, stubborn as much as adaptive, dull as much as chameleonic, and conservative as much as forward-looking. They can outlast the climatic waves of fashion like grass rising after the waves of frost and drought, and they can vanish like the morning dew. They are deeply and imperiously entrenched in existence, giving it shape and structure, but taken out like a sea snail from its richly adorned conch, they display a slimy body shrinking under the sun.

Art as (almost) religion is a recurrent theme. Albert Einstein considered both branches of the same tree. Here is my most recent catch:

> Art is almost like a religion. It is what I believe in. It is what gives my life dimension beyond the material world we live in. Hannelore B. Schulhof.

It is usually "almost" or "like." There is a reason why art is not religion: there is no Art but Art. There is only one Art while there are many irreconcilable religions and sects. [49] More importantly, art neither promises nor delivers you any guaranteed reward or punishment.



Francis Bacon (1909-1992) *Self Portrait,* 1971

Art in the free world is gentle, peaceful, and harmless even if it looks ugly, offensive, and threatening. Art is not supposed to hurt you, bring good luck, or have any magic powers. Francis Bacon will never jump out of any of his self-portraits the way it happened in the story by Nikolai Gogol.[50]

Like gift is recognized by wrapping, art is recognized by its settings. Even then, you need to believe that what looks like modern art is indeed art. If you do not, you may not recognize a urinal, vacuum cleaner, sleeping woman, and a pile of candies as a piece of art even on the premises of an art museum.

Although the belief, which I share, that art is what is called, exhibited, and sold as art is wide spread in the West, it is not universal because the form and content can contradict the viewer's beliefs and experience (this looks like *alief*, see footnote 38). Modern art is profoundly nonconsensual and divisive, but as forgivable as a child's prank.

All that playful evasiveness and volatility of art may cause some mistrust and need of certainty. You need some direct procedure to recognize art as art. There is an old principle "you know when you see it." When an artwork has been sold, its quality and authenticity is already of no importance and out of the question: it has been sold! *Ergo*: art. You know it when it sells.

I suggest a version of the Turing test for art: an object should be presented to a person in an environment drastically different from that of a museum: best of all, in a dump. A painting

[49] Abstract art has a commodity potential. There are web sites that sell different styles abstract paintings on order.

[50] English translation (alternative title: "The Mysterious Portrait"). Gogol (1809 – 1852) was the most quintessential Russian writer. He left a still illuminating encyclopedia of patterns of Russian life, written in all registers of beautiful language.

should be without frame, on a canvass of irregular outline, moderately dirty. A sculpture should better be slightly damaged, an installation somewhat ruffled. Squeamish folks can run the test in their imagination or from a photo "discovered" in a wastebasket.

To recognize a photo as that of art, you need to identify art when it is **not yet called, exhibited, sold, or bought as art**, or at least you do not know anything about it. Can you try that on your friends? Ask them to try it on you? Please.

I need to remind here that neither anybody nor I have any reason whatsoever to launch an invective against art because art, like history or any natural accumulation of things and data, is as innocent as family photos and as blameless as the rocks we stumble upon.

Let us take an example of art known to be especially divisive and even offering some quantitative measure of division.

Figure 9.2 shows two paintings separated by 440 years but somehow linked in artspeak.

Although there is a lot of material about Cy Twombly (1928-2011) online, it is not easy to find a good reproduction of his painting *Achilles Mourning the Death of Patroclus* (1962). It can be seen under magnification , also here. Unfortunately, the Web does not reproduce the important for Twombly (as well as for Barnett Newman and others) effect of its large size, 259 x 302 cm (8'6″ x 10').



Figure 9.2. Cy Twombly, *Achilles Mourning the Death of Patroclus* , 1962, and its enlarged fragment; bottom right: Hans Holbein the Younger, *Dead Christ in the Tomb*, ca. 1522

The painting consists of two spots looking like dry blood tainted with black soil. It also has some pencil scribbles, the largest of which repeats the title. There is a short but typical story related to the impact of the painting. There are testimonies about the strong effect of the work on the viewers. Art is always ready to lend a frame for the picture of your emotional state.

The following two testimonies of two professionals seem as incompatible and irreconcilable as Christianity and Hinduism or Buddhism and Islam. This is what makes art look **like** religion.

Testimony 1.

> His [Achilles'] body is brought back to the Greek camp, where Achilles openly expresses his grief: it is this terrible scene, a magnificent example of male bonding, that Twombly translates into *Achilles Mourning the Death of Patroclus* with an extreme economy of means. Only two red shapes—two spots of this sublime and bloody pictorial mess typical for Twombly—as if thrown on the canvas and spread with hands, dominate the impressive pictorial field. Below, the crossed out pencil inscription "Achilles Mourning the Death of Patroclus" seems to suggest, by its underscored horizontality, an elusive and fleeting presence of a body—**in the tradition of *Dead Christ* by Holbein the Younger** [emphasis mine, *Y.T*]. Both exemplary and unique, with a violence as much restrained as extreme, this work has no equal in Twombly's painting.
>
> From catalogue *Collection art contemporain - La collection du Centre Pompidou, source:* Jonas Storsve, original in French. Translation is mine.

Testimony 2.

> Small children make marks on paper and then explain that this is a horse or an airplane or Mommy, and we willingly concede this; but ought we to do the same with artists' intentions? In 2005 I saw in the Pompidou Center a Cy Twombly painting titled *Achilles Mourning the Death of Patroclus*, the main features of which were a red and a black swirl of paint, the first labelled "Achilles" and the second "Patroclus": on the wall next to the painting were quotations from Twombly to the effect that this painting expressed how much he had been moved by the *Iliad*. The way they presented Twombly's remarks suggested that the curators of the exhibition were as willing to find, and as willing for the public to find, all the pathos of Achilles' grief in these swirls of paint as a parent is to see Mommy in the child's squiggle. And of course once one's imagination is set in motion, one can "discover" all sorts of "mesh" between the work and its presumed meaning – for example, between the color red and Achilles' anger, the color black and death.
>
> Henry Staten, *Art as Techne, or, The Intencional Fallacy and the Unfinished Project of Formalism*. In: *A Companion to the Philosophy of Literature,* Garry L. Hagberg, Walter Jost, editors, John Wiley, 2015, p. 424 (available on Google Books)

What is there to believe?

There is some asymmetry in two accounts. Testimony 1 is a completely subjective and self-contradicting exploitation of artspeak: "sublime and bloody pictorial mess," "as if … spread with hands," "impressive pictorial field," "seems to suggest," "elusive and fleeting presence," "both exemplary and **unique**, with a violence as much restrained as extreme," "this work has no equal in Twombly's painting," "mess **typical** for Twombly." [Unique **and** typical? A typical artspeak]

Does the author really believe his words? I wish I could see in *Achilles* anything sublime, restrained, and looking like Holbein, whose Christ is anything but elusive.

Henry Staten relies on common sense and his personal experience. He denies any interpretation except what is supported by the senses of observers and is beyond belief. But he, too, speculates: "…remarks suggested that the curators of the exhibition were as willing to find, and as willing for the public to find…" This is belief. Or doubt.

Why do I feel the same way as other Twombly unbelievers, even though I agree that it is a bloody mess, only not sublime? Why am I so suspicious and distrustful? It is impossible to argue pro or contra and artwork without belief. What are the facts? Do I need to go to Paris to decide?

The undeniable fact is that *Untitled*, 1970 (**Figure 9.3**), an archetypal squiggle by appearance and mode of production was sold for undeniable $69,605,000. This is modern art and there is nothing to guess and doubt.[51] In spite of all controversies, Cy Twombly's paintings, including blunt scribbles on a blackboard (canvas blackened with house paint), were bought and sold for millions of dollars.

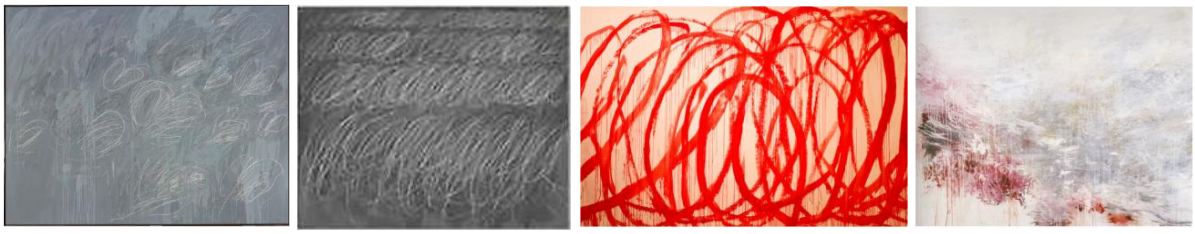


Figure 9.3. Cy Twombly (1928-2011). Left to right: *Untitled*, 1967; *Untitled*, 1970; *Untitled VIII* [*Bacchus*], 2005; *Hero and Leander* (IV; 1984). See extensive gallery.

It is undeniable that many Web denizens who visited Centre Georges Pompidou in Paris, where *Achilles* is exhibited, express their unambiguous fondness of the large painting. For example (Glen Dasilva): "Some people describe Twombly's work as scribbles. I enjoy this painting." *Bacchus* and other effusively sparse paintings of Cy Twombly also have fans in the unaffiliated public.

Twombly's obituary in *The New York Times* in 2011 had 186 reader comments. Out of 134 clearly expressed opinions, 70% were positive to the degree of adoration. I noted a religious overtone: "This type of painting is a form of advanced prayer." There was no reason for the readers to be insincere.

The diverse comments clearly clustered around two focal points. The positive comments extolled the fact of **human** achievement, a kind of *he made it*, while the negative ones looked at **artistic** achievement and found something like *he made nothing*. A few knowledgeable fans refer to Roland Barthes who wrote about Cy Twombly. Here is the orchestral *tutti fortissimo* conclusion of Barthes' article on Twombly's "scribbles:"

> TW's art—this is its morality, and also its greatest historical singularity—*does not want to take anything*; it hangs together, it floats, it drifts between desire, which subtly animates the hand, and politeness, which diminishes it; if we required some reference for this art, we could go looking for it only very far away, outside painting, outside the West, outside the historical period, **at the very limit of meaning**, [emphasis mine, *Y.T.*] and, say, with the Tao Tê Ching:

[51] Nouriel Roubini, the famous economist, the Cassandra of 2008, and art collector, finds a lot to doubt. Also, Google: "modern art" + "tax evasion" + "money laundering."

> He produces without taking for himself,
> He acts without expectation,
> His work done, he is not attached to it,
> And since he is not attached to it,
> His work will remain.
>
> Quoted from: Roland Barthes, *Cy Twombly: Works on Paper*, in: *The Responsibility of Forms*, New York: Hill and Wang, 1985, pp. 175-176. Available on Scribd.

As for the affiliated authors of lot comments at Twombly sales, they display breathtaking artspeak fireworks of truly imperial grandeur and I cannot help emitting in this sentence an art-squeak of my own.

Sebastian Smee (*The Boston Globe*) sounds ambivalent:

> Like so much of Twombly's work, it's right **on the edge of being nothing** [emphasis mine, *Y.T.*]: a desultory blackboard scrawl. Mere graffiti. An insult. A provocation. And yet, even in the context of RISD's crowded and star-studded modern and contemporary displays, it has a tendency to still roving eyes.

Sebastian Smee's casual impression of "scribbles" does not sound like artspeak to me. It is an observation, a fact. It can be explained and debated, while artspeak is sacred and not debatable. Sebastian Smee's intelligent and elegant obituary of Twombly is no typical artspeak either. When he points to "exquisitely perverse sense of composition," I see in *Achilles* what he means. Roland Barth can be, at best, noted and taken to account.

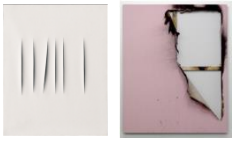
"To still roving eyes…" The live impression is strongly influenced by the current moment, mood, atmosphere, ambience, companions, and preceding events that could go back decades. However skeptical, given a favorable ambience and mood, I could have my eyes stilled by the two black-red spots and imagine on the remaining white field a chapter of my own life—or the whole of *Iliad*. **Two** means a lot: the foundation of human nature and all literature about it. Human nature displays between minimum two humans.

I consider Cy Twombly an outstanding—far beyond the scribbles—figure of modern art, much more diverse, impressive, intriguing, arresting, and much more interesting than his postmodern co-stars who have survived him. This is why I include his colorful, hypnotic *Hero and Leander* in the otherwise "desultory" **Figure 9.3**. I neither like nor dislike him. Details of his rich personal life are of no importance to me. He is part of history, not of my attractions.

I dislike minimalism because of my origin and background. I was brought up in a scarce world where it was believed that human labor could potentially make the world richer. I love complexity and both the process of its **creation** and the process of simplification known as **understanding.**

Here is my personal problem with "blackboard scribbles:" their complexity is so negligible, so "on the edge of being nothing," so "at the very limit of meaning," that any opinion cannot be either supported or refuted. Anything goes. This is n*existence*: something, almost nothing, but with real emotional and monetary effects. The best embodiment of nexistence in art, its true

hyper-realistic portrait, is the blank white canvas. To sell such picture today for $4.3 million you need to make six vertical knife slashes on it, as Lucio Fontana (1899-1968) did long ago in his *Concetto Spaziale*, *Attese* (*Spatial Concept, Waiting;* 1967). The slashes of Fontana or burns of Kasper Sonne look like a further way to decrease existence and flip it to negative values.



A **B**

A: Lucio Fontana, *Concetto Spaziale, Attese* ; B: Kasper Sonne, *Borderline (new territory) No. 11* (1912).

The route from the object to its description in artspeak is strictly one-way. It is impossible to imagine and reconstruct the object from its artspeak representation. This applies to minimalism in general and most of modern art. The viewer is completely free to feel anything. There is nothing to simplify (= understand). At least, there is something to celebrate: freedom. Do I need to repeat my mantra "Art is what…" etc.?

"On the edge of being nothing" is an excellent expression for what I call nexistence. It also applies to the category of **future**, which is where nexistence reins uncontested. Future is always on the edge of being nothing and turning to the presence. The past, however, is never *nothing* for as long as it is remembered, even if the memory is false.

Art, like most of human matters, is based on belief, but even science starts with a belief (hypothesis) or disbelief (discovery). The difference of classical art from modern one is that belief in the former is supported by the context, visual and informative, as well as human experience, knowledge, and memory.



Figure 9.4. Fact and belief. Left to right: Rembrandt: *Prodigal Son; Head of Christ*; Picasso, *Guitariste* (1910-11); Mondrian, *Flowering Trees* (1912); project sketch of Y-Block, Oslo (fragment).

The context in Rembrandt's *Return of the Prodigal Son* (**Figure 9.4**) is obvious for anybody familiar with the Gospel of Luke, but his *Head of Christ* (one of several sketches of the same model) asks for less literal beliefs, unless both pictures are regarded simply as illustrations to a text. For some of Rembrandt's contemporaries, his heads of Christ were offensively modernist. There is nothing obvious in them to associate with Christ, as there is nothing to associate the painting *Guitariste* (Picasso, 1910-1911) with either a woman or any musical instrument, unless we believe the title, the commentaries, or exert our imagination. Piet Mondrian's *Flowering Trees* can be called, anachronistically, *Y-block, Oslo.* Cy Twombly used to turn our blindfolded imagination in the right direction with a dollop of **existence** in the form of scribbles on his paintings.

Everything in religious or ideological belief is belief. The behavior, which is the only possible evidence of a belief, could be opportunism, conformism, delusion, transient mood, or conscious deceit. In an authoritarian society, it could be sufficient to declare publicly the required statement of faith to be left in peace. In a totalitarian society, however, like it was in the

Communist Russia, Mao's China, and is in the Korea of the Kims, one had to confirm it by daily behavior and participation in rituals.

Consensus over perception could be shaky, but it is possible. If nine randomly selected people say that this is a red dot circle (spot, disk, circle) → ●, it exists, even if the tenth witness disagrees. The presence of the red dot on this page can be proved beyond the shadow of a doubt. This is true about the dot, but may not be true about a "guilty" verdict, medical diagnosis, scientific hypothesis, and any majority vote on arts and human matters in general.

Everything in human matters is debatable. The tenth witness could be right and the nine others wrong. What was right yesterday could be right today. What is right today may horrify you tomorrow. Religious fundamentalists can split hair on what was consensual for millennia: who is alive, who is born, and who is dead. Belief is a ticket with its admission stub torn off.



If a young modern artist relies on "Practice!" to get to the Carnegie Hall of art, it is better be practice in overturning the bus.

After 85 pages of this Essay, can I say some fundamental truth that would be not just my own belief but something at least pretending to be provable or at least reasonably hypothetical?

Alas, I cannot. I can see in art nothing but myself. Art is a mirror.

10. ART AS MIRROR

I see a painting. It is a thing made of wood, canvas, and paint. I can describe it as a picture of a young woman with long hair in a strange big hat (**Figure 10.1B**) because whatever it is, I can list all its recognizable components, even if they are small dots and flecks. My description will not be enough to reconstruct the picture, least of all from the "young woman in a hat" title alone. The short description "six rows of dense white spiral squiggles on black background, 68 x 90 in″ (**Figure 10.1C**) is a more informative and better reproducible one. There is a chance that a reconstruction will be close to the original.

The "squiggles" of Leonardo da Vinci[52] (to whom Cy Twombly's was once compared in ecstatic artspeak) show the entire distance between Renaissance and Art Reformation (**Figure 10A**). I measure the distance neither in centuries nor in content, but in complexity.



A B C

Figure 10.1. Art space and art time.

A: Leonardo da Vinci, Drawing of a flood (c.1500) ; B:František Šimon (1877-1942), *Young Woman in a Hat*, *ca*. 1900; C: Cy Twombly, Untitled (New York City), 1968. 68x90″ (172.7 x 228.6 cm). Sale: $70.5 million in 2015. Catalogue note. Video.

Barnett Newman's paintings are so simple that they can be probably reconstructed (*forged* is a better term) from measurements of geometry, color, and the well-known technique of his *zip*.

[52] In his later years, Leonardo da Vinci was preoccupied with water, flood, forces of destruction, and the end of the world. See also his *A Deluge*. We are in his steps today.

In visual arts, everything is *concrete* in the sense of the perceptual, especially "abstraction," and nothing is *abstract* in the sense of the conceptual, except the frills of the artspeak wrapping. "Abstraction" in art means, paradoxically, something so **concrete** that it can be described well enough for credible reconstruction, materialization, and multiplying in many variations. It is a dish with a simple recipe, like French toast. This comparison means that (1) it uses a technology and (2) it can be enjoyed or disliked. In addition to artistic techniques, modern art appropriated the main contribution of its native century: technology.

The objective properties of art, whether simple or complex, connect all art into a single **art space** in which there are pathways of transformation, short or long, from any "recipe" (more respectfully, individual style) to any other. Thus, in the art of cooking, if you have a recipe of Italian Wedding Soup, you can turn it into the recipe of Lasagna by changing the ingredients, sequence of stages, and parameters. We can do it one change at a time, so that each step of transformation will be between close neighbors. Naturally, many intermediate dishes between soup and lasagna can be inedible because some ingredients do not go together, but maybe we should still try them before rejection. Meals, therefore, make an abstract space in which you can travel from one point to another.

As for squiggles, we can move by a series of changes from Leonardo da Vinci to Cy Twombly and, unbelievably, back, which by no means justifies taking any rapturous catalogue notes literally.

> In my culinary analogy I use the idea of the book *How to Bake a Pi : An Edible Exploration of Mathematics* by Eugenia Cheng (Basic Books, 2015). It is about category theory, a branch of mathematic so abstract that some mathematicians consider it mathematically inedible. It is a matter of individual taste, of course. Category theory is not described in the book, however, only what can you do with it. It is an invitation to the party of abstract mathematics without letting you in.

Pattern Theory of Ulf Grenander, which is my personal obsession and foundation of spirospero.net, has a high level of abstraction. Nevertheless, it is applicable to anything concrete, including human matters, individual and global, for which hard science loses its edge. Pattern Theory is a kind of a mathematical chemistry (if not physics) of Everything and its transformations. Its secret is an element of personal "taste" (selection of generators and a template) together with quantitative measure (probability or energy).

Creation is a process, and time means physics. Chemistry is physics of molecules, i.e., **individual structures**, each being the only one in the world[53], and their change into each other. Should I say *creatures* instead of *structures*? Close enough. *Creations*? That's exactly my point, but I have yet a counterpoint to make.

An artwork, for example, any of the three pictures in **Figure 10.1** (I will come back to the woman in a hat later), belongs not only to the art space open to all, but also to a different parallel

[53] While chemical structures are individual, molecules of the same structure are multiple like clones. Structure is abstraction (property, idea), and this is why two equal structures is just one, while there could be millions of equal screws and other Things.

universe: the **perception** of art by any individual in the public, of which I **am the only one** I can observe in full, inside out.

My impression of any artwork consists not only of what I see, but also of what I feel and think in front of it as well as between our meetings face to face. This is what I mean by art as mirror that shows me only myself. "Mirror" is just a metaphor and it should not be taken too seriously, or we would drown in philosophy of subject-object relation.

What I want to say is that my perception of the painting is as unique as the painting itself. In a sense, the painting and I are of the same blood of uniqueness, which does not prevent us from various similarities with other humans and paintings. We, individuals, also inhabit a space where we are split into species, families, orders, etc., quite like plants and animals; so do artworks and artists (ART AS TREE).

The perceptions by other people are unknown simply because we cannot read other people's **minds.** Someday, a successor of Apple or Google or Amazon will develop a system to crack human mind—we are already skilled in manipulating it—but I, retrograde as I am, hate to think about the future in which the difference between humans and robots disappears. But I am ahead of ART AS FUTURE. Instead, I am going to my own **past** stored in the vaults of my own mind.

Next, I am coming to my first electric contact with modern, by mid-20th century standards, art of painting: Josef Sima.

It was in the late 1960's, in a dark, bleak, brutally polluted Siberian city with empty shelves in the stores. May I still allow myself a little *myspeak*, a cousin of artspeak? Thanks.

Siberia had scarce indigenous population. It was colonized by Russia in the 16th century and developed by generations of former escaped serfs, prisoners, exiles of Russian czars and Stalin, and WW2 refugees who did not return home. Surrounded by hills, the city of Krasnoyarsk[54] straddles the powerful majestic Yenissei River with its perpetual nervous shivers along the spine, as if foreboding the Arctic Ocean, its final destination.

Living alone between two marriages and a few impenetrable to nails concrete walls of a small standard Soviet apartment, I was a frequent visitor of the old and rich local library. Scores of pre-Soviet Russian books in its "special" storage were forbidden to read by common Russian public. Young librarians secretly supplied me with famous, quoted, referred to, but unreachable books, which I needed in my search for the Czarist roots of the Soviet empire. The roots have survived to this day and the current tree of Putinism has grown high and wide on them**.**

> Who could imagine in the pre-1914 word that the empire of the czars would fall soon? A few could imagine in the post-1945 world that the Nuclear Empire of the Communists would rise. Even less could foresee its fall by the end of the millennium. But that was already the time to foresee the current restauration of the Czarism by Putin. This experience makes me worried about the future of America. History is not just about the past. It is about the **unthinkable** future.

[54] Krasnoyarsk, founded in 1628, a center of a giant region, has been by now transformed, beautified, packed with universities, theaters, and concert halls, and grown to 1 million residents. It is still the third most air-polluted city in Russia.

As for my personal history, I was about to meet my future wife in the library—a future that somehow has escaped turning into past.

By that time, already deeply immersed in classical music, I discovered the music of the 20th century. Dmitry Shostakovich was aggravating my depression with his bubbles of optimism in the dark brew, while Bela Bartok was knocking me out of anguish by his bitter dissonances, skepticism, and refusal to surrender to both barbarity and beauty. Buying all vinyl LP records I could find, I ran into a Czechoslovak record, I do not remember which, with a reproduction of a painting on the jacket. It was *The Return of Theseus* by Josef Sima (Šíma; sounds Shima).

Theseus, a mythical Greek hero, had promised his father Aegeus to put up white sails as sign of his victory over Minotaur, but he had forgotten his promise and left the black sails on the mast. His grieving father committed suicide, plunging in the sea of his name.



Josef Šíma (1891-1971), *Návrat Theseův*, (Return of Theseus), 1933. Source.

I had glued the picture to the nail-resistant wall and it became a part of my personal mythology. It was unlike any artwork I had seen before and it was stirring some very vague forebodings in my soul under Cold War tension, totalitarian idiocy, and the recent (1968) Russian invasion of Czechoslovakia .

Here in America, I often searched for Josef Sima on the Web in vain until our happy reunion about ten years ago. Recently, I have cast a net into the Net again and found much more materials about the artist. It turned out that Sima was still alive when his Theseus and I had met each other for the first time. As for the picture, it is on my American cardboard-plaster wall again.

At the first glance, I had been struck by the clouds in the sky. Hovering over the grassy sea, they were unmistakably made of stone.

It is hard to say whether the sail is really black or just looks so in the dense shadow of a cloud. Sima is often presented as surrealist, but I see him as a symbolist—the style which, like surrealism, is unthinkable without content. I saw the picture as a metaphor, here a visual one, which is the essence of poetry. I thought the *Return* was about the future caught in the moment of its catastrophic turning into the past. Cornelia Parker's squashed and silenced but still glimmering brass instruments, stopped in their fall on the floor, like Sima's clouds, flicker in my prone to associations mind.

Now, in 2015, numerous works of Josef Sima are scattered all over the Web (example), with comments in English, Spanish, French, and, of course, Czech . **Figure 10.2** shows some of his other works, but I am more than ever certain that the *Return* is unique.

Wandering over any new domain of reality, we accumulate a stock of distinctions between local goods and habits. We begin to judge it not by differences from other domains, but by internal standards and practices. We lose most of the reasons for hostility and outright rejection. This happened to me when I started this Essay. In a modern art gallery, you can pat Minotaur all day long. Wading under the dripping stone clouds through the littered grassy seas of modern art, I lost my initial prejudice against its aggressive, provocative, deceitful, vulgar, and exploiting denizens and found there something to feel at home and to be comforted with, for a while, before returning home.

Modern art without any human or other living presence on the canvas leaves me mostly indifferent. Symbolism and surrealism are my most comfortable artistic movements. Like poetry, which uses human language in the way we never speak in everyday life, surrealism paints the world that we never see around but still easily recognize, like the headless but still human torso in **Figure 10.2.1**.



Figure 10.2. Selected works of Josef Šíma.

1. Untitled; 2. Scenery; 3. Portrait of a Dancer; 4. A Whore of Barcelona (1940); 5. Europa (1927); 6. Composition; 7. **Return of Odysseus, (1943); 8. Untitled; 9. Sea (1960) 10. Untitled (1967). Sources: 1, 6, 9: A; 2: B; 3: C ; 4: D; 5: E; 7: F; 8: G; 10: K. Credit for 3 and 10: Ras Marley (a treasure of a site).**

The minimalist Soviet reality was as boring as a straight line. The curved with passions human body of it was not. Human nature is the most stable and conservative factor on Earth, more that our rivers, woods, and mountains, but it has the same inexhaustible variability.

Looking into the art mirror, I begin to understand why I dislike minimalism anywhere in arts, except literature. In my youth, I was obsessed with Ernest Hemingway. I love understatement and everything that stimulates my mind with incompleteness. I enjoy surprise, novelty,

unpredictability, probably, because in my insulated Soviet childhood in a small apartment of a bleak provincial Ukrainian city (much brighter, it seems, now) it could be found only in books, music, and movies. Another reason could be the respect for human labor and contempt for laziness, both deeply implanted into my childhood values.

Art as mirror means that the live perception of an artwork is an encrypted—subconscious—look at yourself, your own space of childhood, school, upbringing, family, youth, love affairs, politics, and the rest of life, up to the current weather, a recent phone call, and latest troubling headlines. The perception can turn around in an instant, lose the charm halo, or, on the contrary, envelop itself in sweet haze. Recently, having finished a small brilliant book (Jenny Offill's *Dept. of Speculation*), I was so excited by human talent that I would probably be able to praise Damien Hirst's polka dots in artspeak. If you love something, you love everything around.

There are reasons for everything. Why is Rembrandt holding a special place among classical painters for me? Even before I saw my first Rembrandt at the Pushkin Museum in Moscow, I had heard, as a child, a radio play (it was the pre-TV era) about his life. It deeply moved me. The sorrowful sigh "O, Rembrandt, Rembrandt!" still sounds in my ears. I am looking at the *Return of Theseus* 45 years after the first impact and I feel the hot waves of memory.

How do I feel them? This question opens for me the third space of art: **physiology**.

It is well known and described as goosebumps, shivers down the spine, and even "musical orgasm" (Google it). I feel it as a sudden hot wave in my chest and a constriction in my throat. In visual arts, only Velazquez and Rembrandt used to give me that peculiar sensation, if I was in the mood, but with my Odyssey through modern art, it happens more often. In science, it is the moment of invention, discovery, understanding, and solving a difficult problem. It has a tinge of recognition and something of reliving a dramatic past event, like passionate love, shameful failure, painful loss, or escaping a terrible disaster.

I formulate it as a combination of the seemingly incompatible **recognition** and **surprise.** This is what I am looking for in literature, poetry, music, and movies.

> "We feel nostalgia for a place simply because we've lived there; whether we lived well or badly scarcely matters." (Michel Houellebecq, *Submission*, Farrar, Straus and Giroux, 2015, p. 217).

My image of this sensation is the sudden fizzling of carbonated water, quiet in bottle but effervescent when poured into a glass. I also find it similar to a mild electric shock. It does not come automatically as response to the same pieces of art, but depends on the environment, mood of the moment, the overall level of wellbeing (preferably, low), and preceding or pending events. I certainly reject the terms like "awesome feelings," "ineffable essence of existence," or "state of being."

Here is a fresh example. I was looking on Google for Josef Sima. At the Flickr site of Ras Marley, full of rare art, I ran into a picture of a woman in a strange hat and felt the familiar shivers down my spine. It was *Young Woman in a Hat* of Simon Frantisek (1877-1942), an interesting artist and compatriot of Josef Sima. I had never heard about him before.



Figure 10.3. Recognition and surprise. A rat in the hat.

I see no clear reason why I was *electrified* by this picture. I have a weak guess, however. It was a **familiar** generic profile of a young woman in a **surprising** hat that made her look like a rat (**Figure 10.3**).

My favorite poet is Reiner Maria Rilke (1875-1926). The poets I love, including Rilke, sound like nothing one can hear in the street, in a company, or, actually, anywhere. Logically, genuine poetry, quite like modern art, does not make much sense, unless you are tuned up to it. You have to believe in it or just love instinctively or because you see something of yourself in it. Poets are not mad, however. They just do not want to say plainly what they feel, like abstract artists who do not want to paint plainly what they see (this is yet another reason why it is wrong to see this Essay as an attack on modern art).

"…I essentially am not in madness, But mad in craft." (*Hamlet*, III. iv. 187-8.).

I used to read poetry, waiting for my uncontrollable response with **extremely rare** physical sensations and emotions. I expect the same from music, cinema, and other arts. I got the same feeling right after having solved a difficult scientific or technical problem. It is the rarity of this feeling that makes it so treasured.

The mirror of art is hazy and buckled, but at least it can be trusted: it cannot **show** what does not exist. It does not show a big world where the eye can be lost: it shows the viewer, as mirrors do. What do I see there about myself?



Artwork exists in several real dimensions: materials, size, age, amount of artistic labor, price. Labor, originality, imagination, complexity, and intensity cannot be quantified, but they can be loosely compared for any two works side by side. There are also countless transcendent dimensions, like sublimity, simplicity, intimacy, intensity, emotiveness, ambivalence, efflorescence, nobility, brutality, etc. They are expressed in artspeak, which is the inflated language of lot essays and comments at auctions, reviews, and art books. Together they cover the issues of meaning (ostensibly) and price range (furtively). There is also content: a formal dispassionate description of the image as seen by disinterested people. Most viewers can agree, for example, on "this is a stylized drawing of a horse," or "that is a series of alternating 6 horizontal pale pink and 7 pale blue stripes" (Agnes Martin, *Happy Holiday*, 1999) or "a high relief of a winged human-bull chimera." The content can be referred to outside sources, as in classical paintings on biblical themes.

Meaning is the cloud where nexistence rests. It is a guess of artist's intent, personal impression of an art reporter, interpretation of the symbolism of the flowers in a vase, and so on. In modern times, artist's own narrative of intent at an interview is explicit but impossible to verify. The meaning can be a mix of reason, emotion, and distraction.

While I am writing these lines, there is a small group of picketers protesting display of August Renoir's paintings



in Boston Museum of Fine Arts. The reason: Renoir was a bad painter. "Renoir sucks."

Modern art as a whole is a kind of performance art in which an immediate instinctive reaction of public is expected and manipulated. Art is the wind in the neighborhood, to which different chimes respond with different sounds of the same timbre.

Do we love or hate a particular person, artwork, company, gadget, or in fact some principle that the objects represent, or, even deeper, some pattern, event, awkward situation of our past related to the principle? To reach the heart of the matter, do we love or hate something in ourselves? Do we love something because it flatters us or strums our pleasure strings? Nexistence does not exist, but some of us see and praise it and, maybe, even believe in it. What can they see in it but themselves?

A confessed narrow-minded minimalism-hater, I could not understand how anybody can like and praise the scribbles of Cy Twombly when I first discovered them. In my heart, I still do not, but I see in them my regrettable intolerance to something that has no relation whatsoever to myself. Still, paeans to Barnett Newman make me feel fretful and uncomfortable. What do his paintings tell me about myself that I did not know? I am diving into my memory (and Google) and… warmer… deeper… I am 18 years old… and here is what I am finding, to my surprise.

A year of weekly class of formal logic was part of my high school curriculum. We had a wonderful flamboyant and utterly non-Soviet-looking teacher of logic and psychology, who, unfortunately, often missed his classes. In my life, he was the first ever person who emanated active spontaneous intelligence—something impossible to see in Soviet life. Moreover, Semyon Moiseevich Vul was the only living example of what was called in books poetic appearance. After almost 60 years, I am still feeling his imprint: my interest in logical **abstraction** (!), which underlines my skepticism regarding artistic **abstraction**. After long search, I have recently found some details of his biography and creativity, together with a much later photo. Two more teachers imprinted me with interest in abstract mathematics and history, and I remember them gratefully.



Semyon Vul (1970?)

Logic was difficult for everybody, but I was fascinated by its abstractness, power, and rigor. One of the four laws of logic, according to our textbook, was the law of sufficient reason: everything must have a cause. This law, I now believe, had shaped my attitude to doctrines for the rest of my life: I do not easily trust anything I am told—outside poetry—without rational explanation. That was also a reason why I began to doubt the doctrine of Soviet Communism: it was not only self-contradicting but also lacking sufficient reasons, a dogma to believe and, actually, the very first religion I knew. Buddhism was next. Christianity and, much later, Judaism followed.

Only while working on this Essay, I learned that the law of sufficient reason was not a law of logic. It was a not universally recognized principle of philosophy associated with the name of Leibniz, although practiced already by Plato. Anyway, it was too late to reform a fervent rationalist, distrustful of dictates, imperatives, beliefs, and self-evident principles, but it taught me to look for the reasons of each of two irreconcilable positions even if both, as in politics, lacked sufficient reason.

Here are two samples of superb artspeak in which I emphasize, in bold print, a contradiction, as I see it.

(1) Dr. Roann Barris, Radford University, in Barnett Newman and the Sublime: The Terror of the Unknowable .

> If we can reduce Newman's goals to only three, they would be a call for an art which would embody **the essence of myth,** embody the sublime, and an art which would be the pure idea. This last belief is central to Newman's goals: that a shape is alive and contains the awesome feelings which a person has in front of **the terror of the unknowable,** or the sublime. But sublime terror is not the same as horror: horror is what you feel in the aftermath of tragedy, when it is too late to do anything. Terror is what you feel in the face of the sublime: humans can overcome terror through acts of creation and this is the value of art. Yet, this act of creation implies an act of starting over, and for Newman, this is the fundamental issue facing the twentieth century artist: the search for what to paint without making any references to previous artistic tradition.

(2) Sothebys Auction Lot Note, May 2013 (Anonymous phone bidder paid $43,845,000 for the painting) :

> Along with other heroic artists of the Twentieth Century, Newman wanted to regenerate art and society through the invention of new forms of expression that could capture the **ineffable essence of existence.** *Onement VI* and its fellow paintings are not representational – they convey a **state of being and communion**.
>
> In *Onement VI*, the single zip resonates within the canvas and with the viewer; it is described both by sharp tactile edges that retain a crisp memory of the delineating tape and by the gentle laps of marine blue that seep into the void of the cool light blue. Soft ghostly traces toward the bottom of the zip disperse as if into air, while deeper bleeds at eye level seek to bridge the gap of the zip from edge to edge, creating a spatial tension. The act of the pigment bleed is the locus of the temporal element in Newman's work that finds corresponding resonance with the temporal experience of viewing *Onement VI* at our **leisure and contemplatively**.

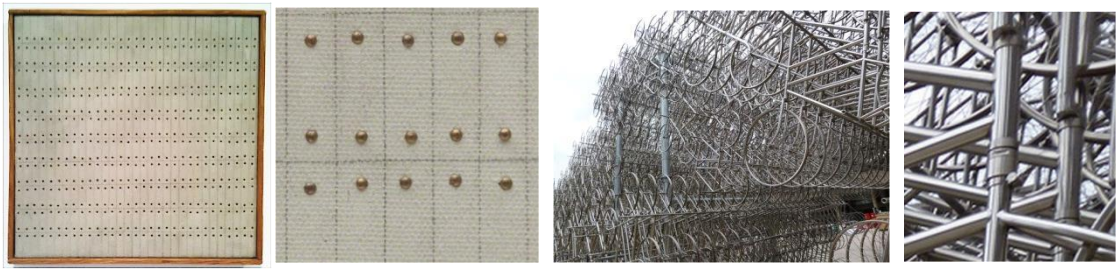
I do not see any sufficient reason for any of both statements basing on the appearance and history of *Onement VI*, but I see **a reason** for the dissonant duo. Art is nexistence and this is why you can say anything about it. It is you who exists and has some personal reason or subconscious urge to make a statement.

Of course, we cannot judge the auction lot notes by the same standards as academic research. The notes are utilitarian poetry and advertisement, as befits this particular genre.

Back to logic, it turns out, after having consulted Wikipedia, that the law of sufficient reason is not a law but a principle, and not of logic, but of philosophy, and it is controversial (as everything in philosophy, which I learned to like as a branch of dreary but imaginative poetry). Imprinted by rationalism, I had settled on science and remained, like an amphibian, at home in arts.

To criticize poetry and arts in general on rational terms is hopeless. Art is never objectively good or bad. If *Onement VI* was sold for $43,845,000, however, there must be a reason for that, rational or not, but definitely simple and clear in advance.

Market is as hard on artists as professional boxing and football on sportsmen. It wears artists down. Success, like gluttony, deposits plaque in their creative arteries. Self-imitation (not to mix up with variations) reminds me of a revolutionary liberator gradually turning into a tyrant.



1 2 3 4

Figure 10.4. Monotony. Fatigue. Self-replication.
1, 2. Agnes Martin, *Untitled*, 1962 (with brass nails) ; 3, 4. Ai Weiwei, *Forever Bicycles*, Toronto, 2013 (not real bicycles). Photos (Flickr): 1. Sam Beebe, 3. Cameron Norman

Self-imitation becomes self-multiplication, quite like the division of bacteria.

Figure 10.4 shows examples of what I do not like in arts: the bacterial self-propagation—the essence of boredom and the symptom of fatigue. At the same time, it reflects how I, imprinted in my schoolyears with formal logic, see the world as a pyramid built from single facts (terms) to more and more abstract ideas. It is also the vision materialized in information technology. This is why I see relations between objects, events, and phenomena that have nothing in common for most normal people. The grids, stripes, and nails of Agnes Martin,[55] 600 stools, 3144 imitations of bicycles, 100,000,000 (150 tons) of porcelain sunflower seeds, and 38 tons of steel reinforcing bars of Ai Weiwei—all that, from the point of view of my personal esthetics, is just one **pattern** of artistic monotony, if not a mania.

Self-multiplication is different from the respectable in music but rare in poetry genre of variations on a theme.

A cycle of variations on the theme of "line" could include power lines, clotheslines, genealogical lineage, and human lineups, branching into food lines, lines of POWs to be executed, children getting into a school bus, etc. Variations change the subject but preserve an abstract pattern, sometimes to hardly recognizable similarity. Artistic style is in most cases a theme with variations. A great artist (composer, writer, poet, performer) is the one who is able to change the **theme**, not just the style of variation. Examples: Beethoven, Tolstoy, Picasso, Rilke.

If art is a mirror, what else do I see in it? It is not the pile of gravel, paper boulders, and hovering stones that attract me. It is the **invisible** human presence of the authors. It is the creators: inventive and stubborn human beings who stand out against the crowd of cross-imitators. For me the presence of life in any form is a condition of artistry, from an uninhabited landscape to human body and all life forms between the two.

[55] Agnes Martin's *Untitled* (1962) with nails belongs to San Diego Museum of Contemporary Art. The almost identical *Little Sister* (1962) is in Guggenheim Museum, New York.

With years, my interest in all arts, including movies and literature, has shifted to **how** it is made. I highly grade creativity, complexity of means, uniqueness, audacity, and the mix of surprise and recognition. In other words, I value performance more than content, somewhat contradicting myself, but I set my own bloodthirsty standards for performance.

Now I am rather indifferent to "what" but hypersensitive to "how." The "how" tells me about the artist, which is incomparably more interesting for me in modern art than what I see in an artwork, even in movies. I am a seeker of human warmth and sparkle. Is there a sufficient reason? Because it is rare.

The low stony clouds almost cutting the water—it is about me because I give in to the illusion that the artist at some moment of his life felt like me. In 1933, in the shadow of Germany, it could be very much so.

I cannot argue with the mirror. One could conclude from my relation to visual arts that I am extremely self-focused. Should I accept it? I have already done that in this paragraph.

For comparison, here are my relations with other arts.

In spite of my wide range of interests, my tastes are very narrow. Oh my God! It turns out that I am a minimalist, too. There are waste spaces of popular entertainment that I completely ignore. My music preferences run from Bela Bartok to Portuguese *fados* and Latino *alegria*, from Franz Schubert to American Blues, and from Sviatoslav Richter and Sarah Chang to Bulgarian folk chorus, but the distance between the landmarks is very sparsely inhabited. Same with literature: my three last reading feasts were John Edward Williams, Michel Houellebecq, and Marcel Proust; the latter was a long and often exhausting climb to an unforgettable view from the top. Sometimes, I take a praised book, start reading, see the author behind it, feel the thin "how," weigh on my hand 400 to 500 pages of "what" (the side effect of writing with computer) and return it to the library after few chapters.

I am deaf to early classical music, baroque, and, with few strong exceptions, most (but not all!!!) of Bach and Mozart, the common musical diet for people of my age. Although repelled by minimalism in art, I chase simplicity and scout simple reasons in human matters, tangled but as simple as a jumbled packing string when straighten. Art, the realm of *what* and not *why*, is not for understanding but for tension and thrill, but I get my strongest kick from *how*.

I dislike anything aggressive and vulgar, as well as predictable, controlled, and mellifluous. I love novelty, even if gritty, but appreciation of novelty can only develop from wide knowledge, which I do not have in visual arts. Fortunately, the Web is a giant, comprehensive, and always open art gallery. Flickr, Instagram, and Pinterest have splendid collections of less known artists. They are coral reefs full of beauty and mystery, not a tank with a rotting shark.

After my first accidental but fateful encounters with modern art, I began to web-educate myself further, which turned out an exciting but finite endeavor. Modern art is an orgy of effervescence, exuberance, and extravagance—complemented by their corresponding opposites. It is also an ebullient local and affordable marketplace. There are young and old obscure artists who could

be reflected behind our backs in the mirror of art before they are captured by headlines and lead to the marketplace in chains made of zeros and clasped with a dollar sign.

This chapter has been a mess. When somebody is analyzing himself, with mirror or not, it is always a mess. I came to the art marketplace not for art, not for my reflection in it, however, but for the message of art about the future of all of us, except myself. I am taking nexistence by the horns.

11. ART AS FUTURE

The future has been the most powerful stimulus for the evolution of human imagination, intelligence, and language. Indeed, everybody can see the present, and if not, it can be pointed to with a gesture or a warning cry. The present is so ephemeral, however, that it turns into past right before one's eyes and loses all its relevance, unless we immediately extrapolate it into the future. We remember and store the past because we need it in the future. But the future, although crucially important for survival, does not exist! How can you discuss it, paint its alternative pictures in the mind, and share it with another mind if you do not keep it in the present by **thinking** about it day and night? I begin to consider the cave pictures as being about the tomorrow's hunt, not the yesterday's one. They were attempts to see nexistence and, probably, retain it in spite of a scarce vocabulary.

With our modern sumptuous vocabulary, it is practically impossible to talk about the epitome of nexistence without falling into some kind of *futurespeak*, similar to artspeak. If I veer off the well-tempered soundtrack, I apologize in advance for my shrieks and moans.

In my search for a magic mirror showing not myself but the future, in which I have no stake at my age, I recall the Reflecting Pool, the uncommon spacious landmark of Boston, **Figure 11.1.**

The photos in the **Figure 11.1** illustrate my vision of modern art as a fenced-off, passive, and enigmatic zone of our civilization. Like water and sunflower seeds, art can fill any shape. It reflects the surroundings. As a small part of economy, it must have the properties of the whole. The active role of visual art in society is minimal, but in advertisement, design, and decoration—and as status symbol—it is by no means art for art's sake. It is because of its detachment that I believe in the prophetic ability of art. Art reflects, foresees, and prophesizes, not intentionally but in a kind of somnambular or drug-induced trance to which, however, hardly anybody pays attention.



Part of <u>Janice Kerbel's series</u> permuting the same words (2014).

Unlike the oracle of Delphi, visual art is silent (maybe, not for long). It addresses our most informative sense of vision and its Pythias speak in puzzling tongs of sign language. Text and speech can be misunderstood, but art has no verbal ← mediator even if it is just word art on paper.

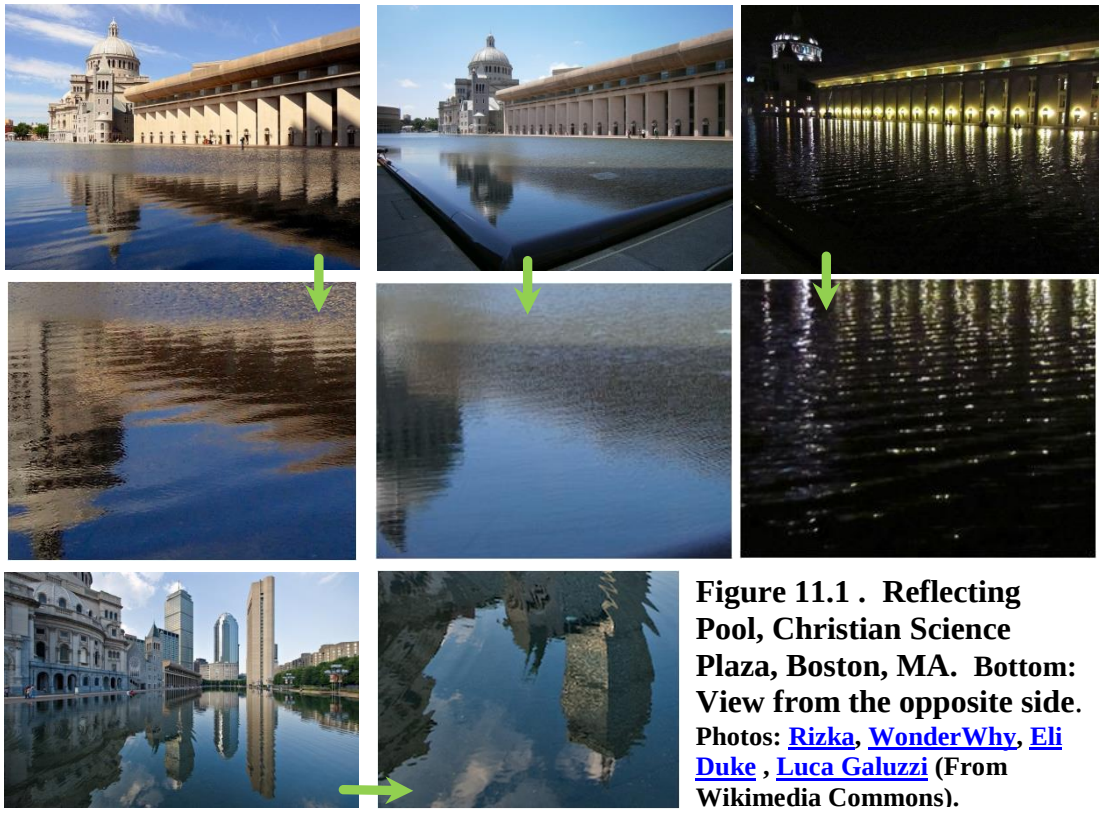


Figure 11.1 . Reflecting Pool, Christian Science Plaza, Boston, MA. Bottom: View from the opposite side. **Photos: Rizka, WonderWhy, Eli Duke , Luca Galuzzi (From Wikimedia Commons).**

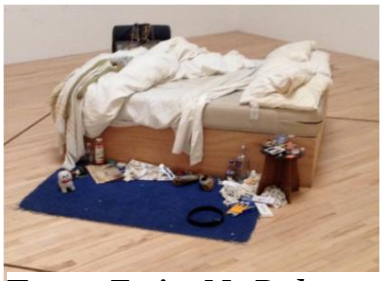
Art can be explored as an emergent or recurrent pattern, the same way the satellite photos of the Earth can be trusted as prophesy of climate change. That can be said about any other facet of our civilization, but the advantage of art is twofold: it is available for observation in its entirety not only in physical space, but also in time, i.e., as preserved history. Even bygone biological species do not have such full continuity of their observable past as pictures and sculptures. Art has been systematically dated, signed, collected, stored, and sometimes deliberately destroyed. Art has nothing to hide and requires nothing arcane to learn. Just do not ask too many questions. You will be told more than you ask for, anyway.

History is potentially the closest approximation of science in humanities —something no scientist will believe but historians are struggling to prove.

As for modern art, we are reminded at each our step through the galleries that there is nothing to understand and everything to experience, as if watching a cake in a glass showcase is experience.

Like the Reflecting Pool—or a bed in a room—art is traditionally elevated above the ground level of daily routine and toil. The Pool shows an upside down image of its quiet ambiance. The capricious and wobbly wind-driven picture on the water depends on your place and time of viewing. On a quiet day, it shows two complexes of worship: one of money, piercing the skies, and the other of faith, kneeling on the ground. You can see one or the other from the two opposite ends of the Pool, which is, in a way, how it works in life, but there is a kinship of belief between both.

Art proudly and defiantly guards its independence, but in our times, all borders, interfaces, and defenses are getting more and more permeable. Even the national borders are mostly symbolic. Art, too, is connected with outer world in numerous ways, some invisible and others, like with money, conspicuous. The very difference between reality and fiction in digital era is vanishing because we are looking at the world through somebody else's cameras feeding the pages of somebody else's websites. Even the money, which in times of classical art could be rubbed between fingers, dropped to jingle on a beggar's plate, and probed by biting down, is immune to the physical conservation laws. It can be erased or created in an instance without your moving a finger—by somebody else's finger.



Tracey Emin, ***My Bed.***
Photo: Leo Reynolds (cropped).

Art is what cannot be expressed in plane words and logical discourse. All arts, even the movies, are articulated, played, and made in ways we do not speak, paint, draw, and act in everyday life. Art is supposed to be something as divided from the ordinary life as the sacred from the profane—for as long as this difference persists. *My Bed* by Tracey Emin, with its condoms and body fluids, forcefully violates the difference, but it is art because it was (1) exhibited **as art** (2) not in a bedroom but at Tate Gallery, and (3) was sold **as art** at Christie's in 2014 for $4,351,969.

The water in the Pool plays with the surrounding solid structures in thousands of ways, depending on the weather and hour. Art plays with life in the same way and often there is no similarity whatsoever between life and its reflection. There can be a reflection without life. Still, art directly addresses human senses, even when a computer squeezes in.[56]

Art is made of physical matter. It is organized as human activity and branch of economy. It occupies designated buildings, occasionally spilling into open spaces. It involves hundreds of thousands of people. This is why art submits to the truly universal dictate of any evolving complex system (*exystem;* see complexity or Introduction to Pattern Chemistry): consume energy, maximize its dissipation, grow, and evolve to stay alive among other competing exystems. Art is similar to economy, ideology, religion, science, culture, education, institutions, organized crime, terrorism, ecosystems, and life on earth. But art is much smaller, simpler, and often as messy as *My Bed*. There could be something we do not see under the pillows and linen. Is it under the bed?[57] Art is drenched in freedom, its body fluid.

I see the world as a laboratory of pattern chemistry.

> I am not going to expand here on what pattern chemistry is. All that, including the concept of exystem, which can emerge spontaneously in a minimalist fashion, but needs complexity to be capable of evolution, can be found on my website www.spirospero.net. It comes from the

[56] "Much of the trouble in the visual arts today comes from our increasing dependence on the Internet, where all the richness and complexity of an artist's painterly surfaces is reduced to pixels." Jed Perl, *The Perils of Painting Now*, *NY Review of Books*, Sept. 24, 2015, p. 57.

[57] The famous economist and prophet Nouriel Roubini, himself an art collector, believes that there is a dark side of art market. There is. See: Sam Knight, *The Bouvier Affair*, *The New Yorker*, Feb. 8&15, 2016. Google: Bouvier + Rybolovlev.

> mathematics of patterns developed by Ulf Grenander and generalization of main ideas of chemistry. Sorry for my repetitions.

In a nutshell, the main idea of pattern chemistry is that the daily configurations of the world are countless and they never repeat. The world is large. Its history is long. Its memory loses details with time. The abstract world of patterns, however, is small. It is countable, recordable, and searchable. A big novelty, which happens not every year and not even every century, can be noticed and entered in the roster. Patterns have a very long life. They can stubbornly repeat itself, of which the latest striking examples are Putin's Russia, brought, in various aspects, 80 to 1000 years back, and the Islamic State setting the calendar 1400 years back—both obsessed with self-proclaimed greatness. The red tide of anti-intellectualism in America makes me nostalgic for the times of Benjamin Franklin. Although, in spite of my age, I have never met him, let me count the description of his lightning rod from my school textbook as a story about my spiritual uncle.

Patterns are long lasting regularities of existence. They are abstract counterparts of the laws of physical nature in the lawless individuality-ridden and chaotic human matters. New patterns of human matters can be discovered like new phenomena and laws in science. At the highest level of abstraction, there are few very general patterns that bridge human matters with physics and chemistry.[58] It means that there are few basic choices for history to change, until something radically new, like the mass **displacement** of humans by robots, appears. The **displacement** of millions from Syria is a distant configuration of the **displacement** pattern so common in the earlier human history. I will add the **displacement** of horses by cars to the same pattern to emphasize the generality of patterns that rivals that of mathematical equations.

> I remember times when drivers could tinker with the engines of their cars. If I am not mistaken, the driverless car, along Elon Musk, already rides on the back of the manhorse (do not mix up with horseman) who is **discouraged** or **forbidden to touch the steering wheel**. This is not an absolute novelty, but a big *pattern novelty* it is. Modern art is also a historical novelty, but there must be its **pattern mates** in all spheres of life where people are driven by nexistence, religion and political ideology among them.
>
> Michel Houellebecq, a new obscenely audacious prophet of postmodernity, perfectly expressed, by chance, the concept of pattern chemistry in his "*Elementary Particles*" when he remarked that humans usually "have a small number of choices, of which an even smaller number is taken." Obviously, it is easier to find the way in a small system than in a confusingly large one. Big data are intended only for computers with their own agenda, quirks, and giant heat-spewing servers banished out of sight to the cold latitudes where the Frankenstein's creation is still wandering over the remnants of the melting Arctic ice, jumping from one ice floe to another and scaring emaciated polar bears. I begin to master Proustspeak.

Art, as I have emphasized more than once, has the advantage of being seen directly in its entirety, as naked as Manet's *Olympia*, without rationalization and without a professional broker. Unlike the wonders of information, art is as material as a bone of a dinosaur or Tracey Emin's *My Bed*. There is nothing hidden, nothing to be ashamed of, and nothing to threaten us. It has no complicated theories behind. It is made to be seen, looked underneath, and (furtively)

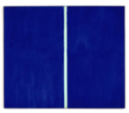
[58] A lot of related material has been accumulated by "Human Thermodynamics." See also.

touched. It can be enjoyed (ha ha) if you are in the right mood, or hated (yuck) if you start picking on and asking questions. Whatever is said about modern art is equally true or false and is not provable or testable anyway.



A pattern historian, therefore, will look for the future in the rolodex of the past.

Patterns cannot illuminate the full length of either past or future. They are not a source of too much historical optimism, but the life of a generation is, in human terms, long enough to quietly accept the idea of historical mortality. "Evolution" sounds not as depressing as death in wars, revolutions, and riots. It sounds cheerful if we call it *progress*, with no real reason.



Here is what I see behind the curtain of Barnett Newman's *Onement VI*.

The main novelty I notice in the panorama of modern art is its topology.

Modern art uses an unlimited combinatory palette to select and mix in any possible way not only colors but forms, objects, things, symbols, materials, chemicals, organisms, bodily excretions, ideas, words, life, death, nature, history, trivia, and, o yes, nothing—all that without constraints of meaning. I am saying "without constraints," but there must be some.

The search for constraints and regularities in arts is a subject of *formalism*. It is a branch of *structuralism*, one of the not too old precursors of Pattern Theory. Structure itself is a topological idea. Formalism studies a work of art, literature, music, etc., as an abstract structure, like the medical student who explores a skeleton without philosophizing about life and death and references to *Hamlet*. I am not sufficiently familiar with research in that area, however, in which *art topology* might have already found its place. I can imagine that "so what?" is the question often returned in response to a grant application in this area.

Art has the double-decker topology of a phone directory. At the basic level, the **potential** connectivity has the topology of full connection: in a work of art, anything can be connected or placed side by side with anything (or nothing) in plane or in 3D space, provided the laws of physical nature do not prevent it. If they do, the connections can be rigged up, as in Cornelia Parker's (and many other's [59]) suspended bricks. The "phone directory" itself changes over time: things and forms pop in and out. The **actual artwork** is like a conference call between several subscribers in the phonebook: a bundle of lines, a bag of dots, along Kandinsky, or a whole republic of small junk, along Sarah Sze. The connections can be calculated or random.

Ai Weiwei has set a totalitarian connectivity record with his zillions of sunflower seeds. Each of them, supposedly, is made unique, but all are trampled the same way by the visitors and their uniqueness and their craftsmen are of no consequence whatsoever.

> Each piece is a part of the whole, a commentary on the relationship between the individual and the masses. The work continues to pose challenging questions: What does it mean to be an individual in today's society? Are we insignificant or powerless unless we act together? What do

[59] Exceptionally inventive Ken Unsworth did it in the 1970's.

> our increasing desires, materialism and number mean for society, the environment and the future? (Tate Gallery comments on the seeds)

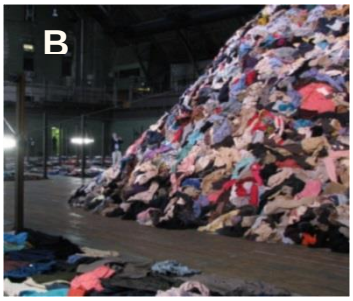
Does Ai Weiwei criticize or exercise the pattern of totalitarian mistreatment of individuality? I see it as an example of the inherent ambiguity of modern art. This ambiguity is not some kind of moral shortcoming but a necessary component of freedom. It is order and control that requires clarity and precision, while freedom blurs the borders and erases them. We are free to like and to dislike, less free with political correctness, more chaotic without it. Freedom itself is among the most ambiguous terms that I know.

There is a much earlier *pattern mate* of Ai Weiwei in European art: Christian Boltanski (France).

> While creating *Reserve* (exhibition at Basel, *Museum Gegenwartskunst*, 1989), Boltanski filled rooms and corridors with worn clothing items as a way of inciting profound sensation of human tragedy at concentration camps. As in his previous works, objects "serve as relentless reminders of human experience and suffering" (Wikipedia).

His similar installation entitled *No Man's Land* was centered on a 25-foot-high pile of **30 tons** of old smelly clothes brought from a textile recycling plant. It was intended to remind about human mortality and the Holocaust in particular. There were also an arrangement of smaller piles, a wall of 3000 stacked old cookie tins, and a collection of heartbeat records, to which a visitor could add his or her own.





Christian Boltanski, *No Man's Land*, Park Avenue Armory, New York, 2010. Photos: C-Monster , Flickr, A and B .

Dorothy Spears' review in New York Times, 5/09/2010, *Exploring Mortality With Clothes and a Claw* was not sympathetic**:**

"…it's hard not to see it as a version of that childhood game, and as an embodiment of a similar, albeit more intense, kind of perplexity and heartbreak;

…large-scale exercise in futility…;

> His engagement with both death and survival has drawn glowing comparisons to the poetry of John Keats, and also been denounced — particularly when his fascination with the Holocaust is most evident — as pornographic and exploitive."



Van Gogh, *A Pair of Shoes*, 1886

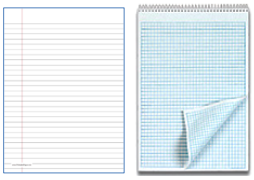
The piles of clothes of different size have been repeated by Boltansky many times, even amid the luxury of old European buildings, like *Monnaie de Paris*.

As a contemporary of the Holocaust, I am itching to say something, but I cannot judge modern art: it has the shortest statute of limitation, if any at all, for its offence.

It may seem that modern art is least of all interested in real life, but isn't art as

curious about a can of cheap soup as Van Gogh was interested in a pair of worn shoes? Isn't *My Bed* the Van Gogh's *Shoes* today? Then it is worth of $4,351,969, considering its size and stuff.

I have already shared (ART AS BELIEF) my observation of *anchoring*: an subconscious yearning of abstract artists to send some signals of real life, like a word or two, a title, usually with no connection to the image, or a political or historical allusion. It could be some subconscious but recognizable content, like the grid or lined paper notebook in Agnes Martin's paintings. I go too far here, I know, but I can't stop.



To an educated eye, any abstract element of a composition evokes scientific and technological associations. Abstraction in sciences, natural or not, is what **cannot be seen**, but can be thought of. Triangle for me is a geometrical reality. Abstract art can hardly **surprise** me. It surreptitiously exploits the natural human desire of **recognizing** a comforting familiar image: cool safety of a dark cave, freshly painted wall of a room in a new home, motley fabric of a woman's summer dress, and dramatic colors of the sunset.



Art can be a bare wall but it still must have something to hang a hat on.

The future that art prophesizes is permeated with ambiguity. Dealing with believers, you never know what to believe and whom to trust. Each of your own beliefs has a shadow of a doubt. The professional knowledge is too arcane, so that you need an expert or mediator. Can you trust anybody in the world where you never certain who sends you an email: man or woman, friend or foe, computer or human, where inventions and technology are becoming double-edged sword and a universal key to all vaults because everybody is potentially connected to everybody and everything? A drone, which I have recently seen behind my window, the camera of my computer (I tape it over when not needed, following a professional advise which I do not believe), your smart time-gobbling phone (I do not have one), they want your soul, secrets, shames, and occasionally your very life. You are at the entrance into a prehistoric cave where the daily and nightly live of everybody is opened to all. You are where nothing is what it looks and nothing means what it says. You are the Naked Emperor who trusts the tailors. You are taking nexistence too seriously for your own good. A hard-boiled liberal, you worship your own pantheon (libertheon?) of nexistence. This is the topology revolution, started in art long before the digital revolution.

The choices of most fundamental historical patterns in the world and, coincidentally, the main American political choice, are as minimal as they can be: there are exactly **two (2)** of them: the **Red** and the **Blue** for America, rare **democracy** and prevailing **autocracy** for the world history. I am being carried away on the wings of futurespeak, bye-bye….



Jasper Johns, *Figure 2*, 1963

"I want to connect the world" (Mark Zuckerberg , 2014) sounds to me like one of the most ominous mantras ever vocalized with the tacit "connect to me" rider.[60] It has been the ultimate goal of intensely material caliphates, empires, kingdoms, religions, Communism, Islamism, Putinism, and, on similarly

[60] Especially in the wake of terrorist acts in Paris, November, 2015. On liberalism, see *Essay 16, On Somebody Else*.

ambitious scale, Amazon, Alibaba, Facebook, Google, and other benevolent behemoths, which we love to be petted by. I cannot deny that "connect" has been a mantra of liberalism, too, only with non-existent *we* instead of the full-blooded I.

I cannot imagine freedom in a super-connected world, all the more, the world where humans are connected with Things like a captive with his handcuffs, the keys in the jailer's pocket.

> Why am I so negative? I seem to be pulled into politics. Away from it! Back to the quiet of the museums and galleries! Back to my banished under the desk old (a few years) Dell computer!

What has it to do with peaceful, self-absorbed, innocent, playful modern art? My hypothesis is that art has been prophetic and freewheeling ahead of the rest of economy because of its **freedom**: from politics, ideology, manufacturing, communication, banking, war, world conflicts, entrenched establishment, and, most importantly, from doctrines and propaganda. Where else can you find it?

So much for nexistence, but what is existence, by the way? Existence is everything from proven possibility to certainty. Anything that has **already happened** has a proven possibility, which is the same as to say that it is not new. The future, obviously, stays behind that line.



Existence: the deer down the road exists even if only a possibility.

When I hear the imperial edict "connect the world," which is not a dream but realistic intent, I easily imagine the connection as a tight Knot in which everybody and everything is as close to everybody and everything as in the cave of a prehistoric tribe.



Today, in 2015, it is clear that Things and humans are not separated by infinite distance in Jeff Bezos' Amazonia (which I am using with guilty satisfaction): they are looking at each other through the class-proof glass like two close species[61] that can already communicate by speech, all the more, gestures.

The future exerts immense power in a mystical and eerie way. It acts like the gravitation of celestial bodies, creating orderly orbits, and it works like heat, storms, and earthquakes, creating disturbance and chaos. The future plays with the fluid substance of human soul like the moon that keeps the fringe of the land wet under the push and pull of the tide. The future—sometimes taking form of the past—inflames human mind with tempting visions and chilling nightmares. It shapes individual fate and creates global history. Physical bodies, however, are completely indifferent to it because physical laws, believe it or not, are immutable by our definition of them and by the shortness of human presence in the solar system.

Future, mind, soul, deity, art, belief, ideology—those are the strangest things that I know. I hesitate to call them irrational or transcendental because they are part of human nature, which is

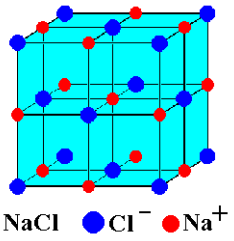
[61] See Charles Murray, *Coming Apart: The State of White America, 1960–2010* (2012).

much more resistant and resilient than the ocean, land, and atmosphere of our planet under all the heavy material Things that crisscross, slash, and pierce it.

As for the future of art, its paradigm swing may come sooner than we think. The direction of a possible change is toward novelty, uniqueness, originality, humanity, constraints, and complexity as measures of value.

Modern art was the first human creation capable of connecting and reconnecting the world in a dreamy, reflective, and non-competitive way. The topological revolution that has been sweeping professions, occupations, institutions, borders, limits, beliefs, and the entire world order grounded in geography, meaning, and moral dichotomies, is what can be seen with a hindsight in the prophesy of modern art.

I see the future of the world as a continued topological tightening with the shrinking of distance between humans, Things, and ideas, good and bad, true and false, friend and enemy, help and harm, existence and nexistence. I see no universal brotherly love in that, neither do I miss it, except in a real family.



Please no association of colors with US parties.

We are in the World War 3 between democracy and autocracy with democracy in the state of a civil war and autocracies in their own global fights. Changing my position from artistic to scientific, no matter who wins, we will keep crystallizing in a lattice of humans and Things. In a crystal of salt, any ion—big negative chlorine or small positive sodium—has both kinds of neighbors in its close vicinity. Similarly, we will have all sorts of connections with benign and hostile species of civilization, mostly Things and humans, in a tight structure no more under human control. We will be always told that the fetters of connectivity look cool, make us look younger, and are good for us, yet some of us will never believe. We will be told in big red letters that the patriarchal past with topology of *pyramid* is “good for you," but the future still offers us at least a binary choice.

But at least *my home is my castle*, isn’t it? I was stung by the realization that the drones were the latest step in cracking open our castles and huts when a hummer had sailed right behind my window. Was it looking for *my bed*? Or under it?

Almost 100 years ago, art had croaked “*Dixi*” in its kinky sign language.

12. DOES NEXISTENCE EXIST?

I have not studied the entire history of nexistence, except as a prominent feature of Russian history in the 20th century. It is quite probable that somebody, apart from Plato, Hans Christian Andersen, and Andy Warhol, has already heavily contributed to the subject. In modern times, neither Sartre's *Being and Nothingness* nor Heidegger's *Being and Time* has anything to do with what I call nexistence, unless you take the exasperating obscurity of both books as a kind of artspeak. Yet, while editing the already finished *Essay 60*, I have found some reports of three most recent (2015-2016) sightings of nexistence.

1. Peter Schjeldahl, the art critic of *The New Yorker* magazine, concluding his review of the recent exhibition of Robert Ryman [an abstract artist who used only white color for most of his life], writes:

> The emperor—roughly, high-modernist faith in art's world-changing mission—could retain fealty only if stripped of fancy styles and sentimental excuses. That was Ryman's formative moment. It was succeeded by a suspicion, now amounting to a resigned conviction, that contemporary art is an industry producing just **clothes, with no ruling authority inside them**. (*The New Yorker*, December 21, 2015)

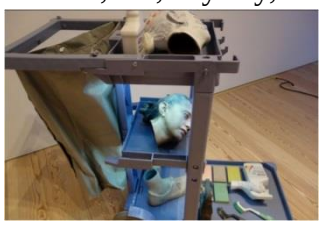
2. In the concluding chapter of his heart-breaking, gut-wrenching, and mind-boggling novel *The Sympatizer* (Grove Press, 2015), Viet Thanh Nguyen writes:

> How could I forget that every truth meant at least two things, that slogans were empty **suits draped on the corpse of an idea**? (p. 355).

About the commandant of a re-education prison camp established by the North Vietnamese in the South Vietnam after their victory:

> He saw only one meaning in nothing—the negative, the absence, as in *there's nothing there*. The *positive* meaning eluded him, the **paradoxical fact that nothing is, indeed, something**. (p. 356).

3. The third sighting is a complicated subject, see Ben Lerner, *The Custodians* in *The New Yorker*, Jan. 11, 2016, on how the difference between the wrestling existence and nexistence in art is blurred, but, anyway, both clinched fighters are being carried into "forever." This is how I see the problem, at least in part.



Josh Kline, *Cost of Living (Aleyda)*, 2014. Source: Paddy Johnson, ArtFCity.

Modern art, made of or with chemically and physically unstable junk, can have a short life span. What to do with it? This is the problem the new Whitney Museum of American Art has to deal with. The answer is restauration: to **replicate**, enhance, rebuild, redesign, or remake the original in other ways.

The full title of the artwork by Josh Kline is "*Cost of Living (Aleyda)*". Aleyda is a real woman, a housekeeper of a hotel. Parts of her digitally

dismembered body—the head, made as realistic as wax figures of Madame Tussauds, hand, and foot—are put on a standard janitorial cart together with cleaning and scrubbing tools of the janitorial trade, all that 3D-printed. It can be seen on the Web. The 3D scans could be stored indefinitely and used for the replication.

It has been missed that even the scans must be somehow rejuvenated because digital equipment also progresses and the old files could become unreadable. Definitely, never say "indefinitely."

A similar problem arises with the unstable paint of Mark Rothko. For some of his large paintings, **replication** was considered, but the final decision was to project correcting multicolor lights on the painting.

What is the artwork which has been **replicated**, artificially enhanced, cloned, or recreated without the participation of the artist and, probably, after his death? Would it still exist?

Should the physical existence of a dead artwork be cared for like the bodies of Lenin and Mao Zedong in their mausoleums (if they are not already 3D-printed)? Do we need to prolong the existence of nexistence? Does the original work still exist in its replica? Does the artist remain the author of its replicated work? Is the cost of living of "*Cost of Living (Aleyda)*" worth keeping it alive? As Ben Lerner uses the term "veneration" regarding the attitude to the restoration of art objects, is modern art edging further toward an entirely Durkheimian religion? With tying art to political categories, are we using helium balloons as anchors?

I began to dig deeper for the roots of the "*Cost of Living (Aleyda).*" There must be some explicitly named nexistence, I thought. There it was, a really big nothing that was big something: capitalism.

Severed human heads, the precursors of "*Aleyda*," entitled "*Living Wages/Big Nothing*," were exhibited by Josh Kline as early as in 2004 at *The Big Nothing* exhibition of Institute of Contemporary Art (ICA), University of Pennsylvania. I quote from the source.

> **Ostensibly about nothing**, this group exhibition spanned several decades of production by over 50 international artists who explored **nothingness as the subject of artistic rumination** and negation as a creative and political strategy. The exhibition pondered the vacuity of contemporary consumer culture on the one hand with works by Andy Warhol and Richard Prince, for example, and on the other, sought to understand the **importance of the void in spiritual fulfillment** as famously exemplified by Yves Klein. [Yves Klein (1928 – 1962), French artist, see **Figure 4.2.** –Y.T.]
> ……..
>
> In recent years, [Josh] Kline has developed a body of work about the body and labor in the twenty-first century. Speculating on capitalism as perhaps the **ultimate big nothing in our society**, Kline has created a new two-part project for *ICA@50* that looks at a FedEx delivery worker and his identity as a laborer in our economy.
>
> On a view at ICA is a series of sculptural portraits produced by 3D biometric scans of FedEx delivery person—an expression of Kline's ongoing interest in human capital and its role in our society.

It is difficult to sort out. Neither could it be brushed off, which is never recommended to do with nexistence, especially as elephantine as capitalism. Was the Davos Forum of 2016 , in fact, about finding the Abominable Snowman in the Swiss Alps and not about capitalism and the Fourth Industrial Revolution?

My *Essays à la Montaigne* are finished. But previously invisible nexistence, once captured and illuminated, now seems to be around every corner.

4. Here is yet another example. The almost 3000 years old ancient Chinese book *I Ching* (*The Book of Change*) is still fresh and in everyday use in the culture of China and South-East Asia. It is also a long-time teaser of the Western world. I quote the recent review by Eliot Weinberger of two of its modern translations into English (*What is the I Ching*? *The New York Review of Books*, February 25, 2016, p. 20):

> It [*I Ching*] is the center of a vast whirlwind of writings and practices, **but is itself a void**, or, perhaps, a continuously shifting cloud, for most of the crucial words of the *I Ching* have no fixed meaning (p.20).
>
> One could say that the *I Ching* is a **mirror** of one's own concerns or expectations (p.24) .

5. Finally, another attempt of ending this overstaying Essay.

In my youth I was taking my life lessons—as well as, much later, the inspiration for these Essays—from Montaigne's *Essays*. I was impatiently waiting for the next book of Sarah Bakewell whose *How to Live: A Life of Montaigne* (Other Press, 2010) I admired. Sarah Bakewell is unlike anybody else in the genre of biography, but it would take another Essay to explain why. Anyway, literary critics and readers have well appreciated her brilliance. Her most recent *At the Existentialist Café: Freedom, Being, and Apricot Cocktails* (Other Press, 2016) is now in front of me, finished, and even more impressive. For two days I was glued to it, reading about Edmund Husserl, Martin Heidegger, Jean-Paul Sartre, Simone de Beauvoir, Maurice Merleau-Ponty, and others, always feeling the presence of the author in the list of her characters (and even in the illustrations). Just one example: "Rereading him [Heidegger] today, half of me says 'What nonsense! While the other half is re-enchanting.'" (p.186).

The high tide of existentialism receded into history decades ago. This pervasive but elusive subject kept bothering me since I had first encountered it long ago and until Sarah Bakewell's book. I referred to Heidegger, Sartre, and existentialism many times in my Essays, especially, 18, *On Everything*, 27, *The Existential Sisyphus*, 29, *On Goil and Evod* , and 45. *The Place of Philosophy in Science* . For the first time, after many attempts, having unsuccessfully wrestled with *Being and Nothingness*, *Being and Time*, and even Wikipedia (!), I feel like I understand, thanks to Sarah Bakewell, what phenomenology and existentialism are, how the latter came from the former, how both were incubated in the same culture that hatched all modern arts, and how much the thin intellectual substance of that philosophy was fortified with the intense, tangible, sometimes even carnal human stuff of the personal stories of its notables bruised, one way or another, by the experience of WW2. I also understand why I could not understand it earlier.

Existentialism generated long shelves of non-fiction books (rarely comprehensible), subculture (usually insular), buzzwords (typically overblown), fiction (often pretentious), and theater (frequently absurd), but I quote Sarah Bakewell (p. 33):

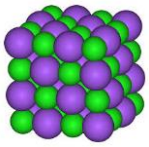
> **What is existentialism anyway?** Some books about existentialism never try to answer this question, as it is hard to define. The key thinkers disagreed so much that, whatever you say, you are bound to misrepresent or exclude someone. Moreover, it is unclear who was an existentialist and who was not.

This smells like at least 100 proof nexistence. In the first chapter (p. 34) Sarah Bakewell gives a crisp translucent nine-point explication of what existentialism is about, which, in my view, without a slightest criticism of her, but with a great skepticism regarding her subject, is a collection of ultimate trivialities. The concluding chapter, almost painfully brilliant, conveys the measure of her own skepticism. But there is much more in her book than philosophy: a less known aspect of cultural history of the same period that witnessed the Cambrian Explosion of modern art. Philosophy, however, is a strikingly less pecuniary business than art. Money appears in her book only as strewn around by Sartre's generosity or needed to pay urgent bills.

In short, my idea of Jean-Paul Sartre's version of existentialism is: whatever you ask a philosopher's advice about yourself, the answer is the matter of your personal decision and responsibilities. Do not bug the sage. Look into the mirror at your own concerns or expectations. You are free to decide. You anguish, but do not brood for too long: decide and act.

With this scant personal extract, I welcome existentialism as philosophy to the realm of nexistence. Nexistentialism of *I Ching*, modern art, supremacism, nationalism, exclusivist ideology, and stern unforgiving religions create real powerful full-bodied **structures of something around nothing**, some of them bloodthirsty. But *I Ching*, modern art, and existentialism do not pit people against each other. Even the pumped up with brazen nexistence US Presidential Campaign of 2016 will end, hopefully, with exhaling all its hot air. The white Union horse, its coat a patchwork of blue and red spots, clanking with firearms, will chug along, in spite of gloom predictions, toward the next gasp, along the pitted and cracked national roadways.

6. Wait! Roadways? Roadways… Now, what about driverless cars? It seems like the case of **nexistence at the wheel**. This is a juicy morsel for a new philosophy of human/Thing condition.



Ideas—patterns of existence—never die. If I were a philosopher, I would return to the oldest problem of my profession: what is really real, reality or ideas? But I am, happily, a chemist.



2016

NOTE (2017): Trump is President! Nexistence presides.

ESSAYS *à la* MONTAIGNE

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